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Lake Freight Outlook.

The outlook in the iron trade will prompt a movement of vessels early in April this year, if the weather is at all favorable to the opening of navigation at that time. The ore companies that have vessel interests will pay no attention to the policy of delay in opening navigation that has been advocated in the past, but will prepare for an early start this year, more so than in any of the past two or three seasons, as they have reason to expect a demand for large supplies of ore. They will probably be selling ore within the coming week, as it is understood that some of the furnace men are ready to make purchases as soon as the arrangement of the price schedule, now under way, is completed. A knowledge of these conditions has caused some anxiety among vessel owners in different parts of the lakes, and Cleveland agents have numerous inquiries regarding the probable lake freight on season contracts. An answer to these inquiries may be made by quoting a vessel owner who is in close touch with both sides of the situation:

"Ore sales may be made," he says, "within a few days now, but the vessel owner who has no connection with ore interests may as well make up his mind that he will have to wait for anything that he may get until such vessels as those of the Bessemer Steamship Co., the Minnesota Iron Co., Republic and Lake Superior iron companies, Mutual and Menominee transportation companies and others of their kind are filled up. Just now, more than in any other season for a long time past, the individual vessel owners are at a great loss in not having a leader who could induce them to stand together for a 70-cent season freight, which they would certainly get before May 1 if the sales of ore develop to the extent that is expected. The vessel man would have everything to gain by insisting upon such a rate and nothing to lose, as there is certainly no money for the best of ships at 60 cents and little to be made by most of them at 65 cents. If 70 cents could be considered in any way unfair to the ore interests this argument might be questioned, but not more than 5 to 7 cents of the 15-cent advance in ore is involved in extra wages at the mines, and the ore producers are therefore better off by about 10 cents a ton than they were a year ago, as costs are not increased in any line other than labor."

If the owners of lumber vessels succeed in perfecting their organization for the maintenance of freights they may laugh at their more wealthy brethren in the ore and grain trades. Mr. A. M. Carpenter of Port Huron, secretary of the Lumber Carriers' Association, has prepared in pamphlet form the full scheme of the association as adopted at the Detroit meeting. These pamphlets, with membership application blanks, are being distributed, and as the complete plan of organization becomes understood it is meeting with favor. Officers of the organization confidently expect that the required tonnage will be secured within the next few weeks, and that at another meeting, to be held as soon as possible, the doubtful owners will be most enthusiastic when they realize the full force of the association.

The New Canadian Lake and Rail Line.

Agents of the Canadian lake and rail line that is to be established during the coming season via Parry Sound on Georgian bay, have been figuring with different vessel owners around the lakes for steamers suited to the package freight and grain trades, and are said to have chartered three Cleveland boats, as well as the Chicago steamers Arthur Orr and W. R. Linn, the latter now building at South Chicago. In a report to the Western Joint Traffic Bureau, a railway association, the freight agent of the new line says:

"It is our intention on the opening of navigation to put on three boats from Chicago to Parry Sound, the capacity of which will be in the neighborhood of 3,000 tons each, which will call at Milwaukee; also two boats from Duluth, with about the same capacity. At Chicago we have leased a dock between the dock of the Ogdensburg Transit Co. and the Lehigh Valley Transportation Co.'s dock, on which there is being erected a warehouse about 425 feet long, with an average width of 110 feet. At Parry Sound we have an elevator now ready for the handling of grain, with a capacity of about 1,250,000 bushels, and will have a warehouse 600 feet long by 80 feet wide, as well as a flour house 600 feet long by 80 feet wide, and 2,500 feet dockage accommodation, on a 22-foot water line. We are also building at Coteau Landing on the St. Lawrence river, at the mouth of the Soulanges canal, a transfer elevator of 500,000 bushels capacity, which will handle 240 carloads a day, and also a warehouse and docks of sufficient dimensions for the handling of flour and package freight, our idea being to float our grain and package freight to Montreal and deliver alongside of the ocean vessels in Montreal harbor."

It is expected that the enlarged dock of the Union Dry Dock Co. at Buffalo will be completed about the middle of next week. The Hawgood steamer S. S. Curry will be the first vessel to go into the dock. The Union company has a very large amount of repair work to complete before the opening of navigation. A job just begun on the Lackawanna line steamer Russia will involve an expenditure of about \$20,000. The large steel tug building at this yard for the Maytham line is entirely plated.

The Cleveland & Buffalo Transit Co.'s side-wheel steamer City of Erie will be launched at the Wyandotte ship yard of the Detroit Dry Dock Co. at 2:30 p. m. Saturday, the 26th. No ceremony has been arranged for the launch. It will be witnessed by Gen. Manager T. F. Newman and a few of the directors of the Cleveland & Buffalo Transit Co., together with officials of the dry dock company.

Chief Engineer Wm. P. Anderson of the Canadian department of marine and fisheries contributes an article on "Shipping of the Lakes" to the February number of the Nautical Magazine (English).

General Activity in Ship Building.

Eastern ship builders, notably the Harlan & Hollingsworth Co. of Wilmington, Del., and the Roach yard at Chester, Pa., have secured several important orders within the past few weeks, and the condition of the ship building industry throughout the United States is now more active than it has been at any time for a number of years past. The construction of river boats for the Yukon trade, and the rebuilding of a large number of sea-going ships that are to be engaged in Alaskan trade on the Pacific, has furnished a large amount of work, not only to Pacific coast builders but also to ship yards in the east. One concern in Seattle, the Moran Bros. Co., has a line of Yukon boat work under way that aggregates about \$1,250,000 in value and skilled ship yard workmen are so scarce at the Union Iron Works in San Francisco and at other points on the Pacific that the Alaskan Commercial Co., which is about to build several river barges, found it necessary to engage more than one hundred men in the east and send them by special train to the Pacific coast. In New York the American Mail Steamship Co., just organized with a capital of \$1,000,000, is preparing to place orders for four steamers for foreign trade. This company is made up of well known shipping men and there is no question of their ability to carry out the plans upon which the company has been organized.

At Roach's ship yard, the Delaware River Iron Ship Building & Engine Works, Chester, Pa., there are now six vessels, representing a value of over a million and a quarter of dollars under way, and a seventh, a New York ferry steamer for the Grand street line, is in the water ready to leave. The latest contract secured by this company is from the Pennsylvania Co., for a ferry steamer to go on the route between the Jersey City terminal station of the Pennsylvania Co. and the Twenty-third street station in New York. This steamer will be constructed of steel and the hull will be 206 feet long, having a molded beam of 46 feet, and a beam over all of 65 feet, with a depth of hold of 17 feet. The upper works will be very substantially built of the best joiner work and the two great cabins will afford room for carrying a large number of passengers. The general arrangement and appearance of the cabins will be similar to the other three vessels in the same service, but the boat will contain many improvements over their designs, the result of the experience of Mr. H. S. Hayward, who designed the vessel. The cabins will be finished in ivory painting with panels of staff in embossed designs and mahogany railings and columns. The floors on both decks will be covered with interlocking rubber tiles. There will be two propellers on each end of the steamer, the wheels being 7 feet 10 inches in diameter and cast from open hearth steel. The power will be furnished by two compound engines of the three-cylinder type, with two high pressure cylinders of 20 inches in diameter and low pressure cylinder 32 inches in diameter, with a stroke of 24 inches. Steam will be generated by four Thornycroft water tube boilers, each with 60 square feet of grate surface and 2,295 feet of heating surface given by 420 tubes. There will be two smoke-stacks. The boat will make about 17 miles an hour, a high speed being necessary on account of the long run up the North river and the necessity of prompt connections.

H. M. Bean of Camden, Me., has contracted with Capt. Crowell of Tom's River, N. J., to build a five-masted wooden schooner of 260 feet keel, 44 feet beam and 21 feet hold.

A Washington dispatch says that Detroit is certain of getting the Algonquin, first of the two revenue cutters now nearing completion at the Globe Iron Works, Cleveland. This vessels will replace the Fessenden, which will be sold. The station of the second new vessel, the Onondaga, is still a matter of doubt. Some of the treasury officials do not like the idea of having her stationed one year at Buffalo and the next year at Cleveland. In general dimensions the new vessels are the same as the Gresham, built by the same company and now stationed at Milwaukee, but they will be about 56 tons lighter than the Gresham and will still have more boiler power. With these points in view, the revenue cutter officials are expecting a slight increase of speed in the new vessels. The Gresham has a record of 18 1/4 knots, or about 21 statute miles, which makes her, with possibly two or three exceptions, the fastest steamer on the lakes. If this speed is exceeded by the new vessels, Algonquin and Onondaga, they will be able to beat the Northern line passenger ships, City of Buffalo, Christopher Columbus or any of the flyers that have been placed in the 21-mile class.

It would seem that production in the iron trade has been brought to its present height through the general agreement that 1898 will be a year of large business, and early preparation has been made by producers to meet a demand not yet realized. Yet the inquiry in many lines gives indication of the large business just ahead and much of which within a month or two is likely to be found on the order books of the mills. Here and there prices of finished material have yielded a trifle under the wait of the past three weeks. In general, the evenness of the market since Dec. 1, under the enormous consumption going on in all lines is practically without a parallel in the history of the trade. A further meeting of Southern pig iron producers is being held this week. It is believed some betterment in prices on Southern irons will come out of it, but there are still some objections to overcome.—Iron Trade Review.

There is much comment because, thirty-five years after the war, we are paying out nearly \$150,000,000 a year as pensions to veteran Union soldiers, and suggestions are made by which to reduce these payments. But foreign ship owners are given a sum each year about twice as large as we pay our veterans. This fact receives but indifferent attention, and there is almost no suggestion of a positive intention to cut off foreign ship owners who are sapping our commercial life.—Commercial America.

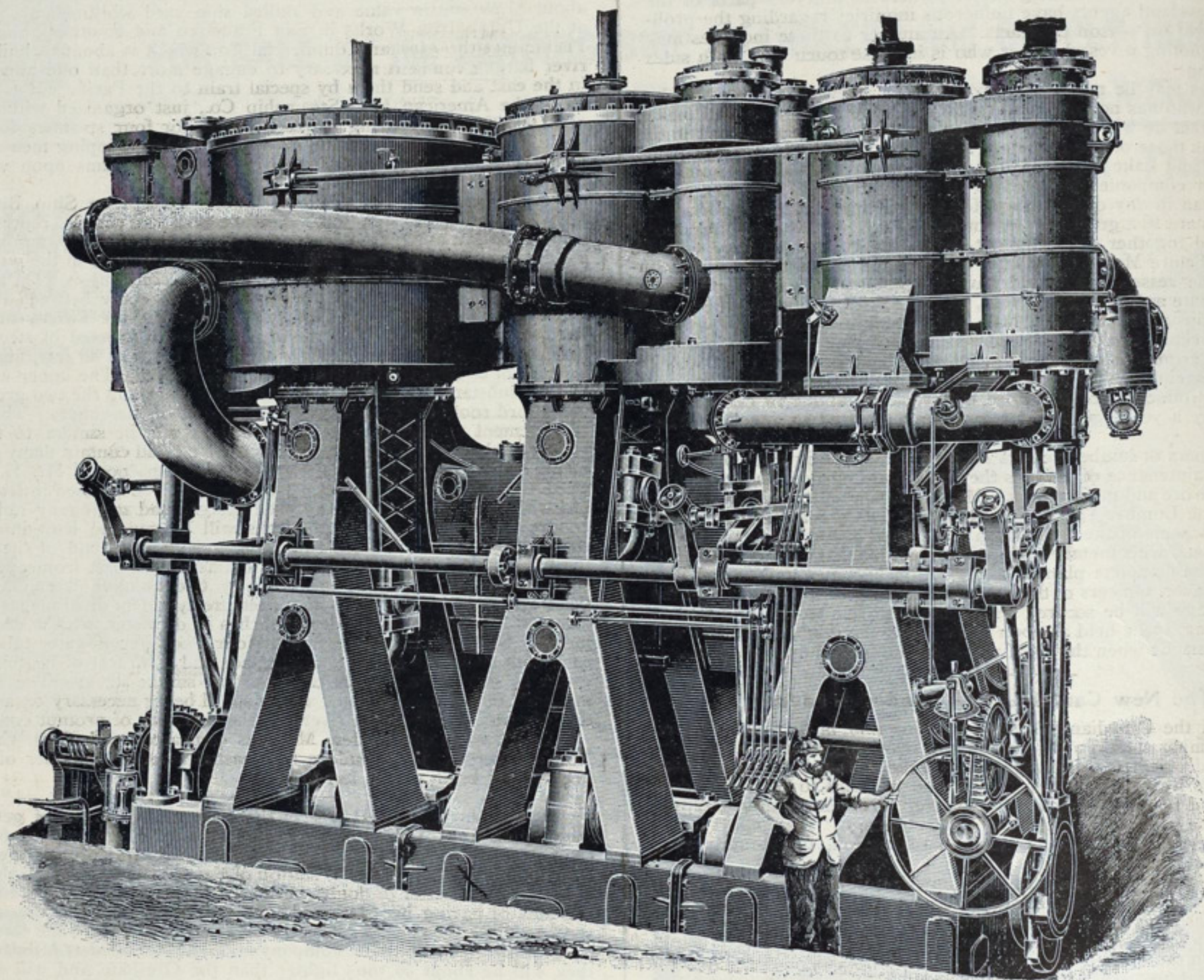
Russian Imperial Yacht Standart.

Steam yachts building in this country for Howard Gould and Col. Oliver Payne are of great dimensions and high power, but the American millionaires have not as yet reached the standard set by some of the heads of European countries in pleasure craft. A yacht recently built by the firm of Burmeister & Wain, Copenhagen, for the Czar of Russia is of 5,255 tons displacement and has engines that developed 12,000 horse power for a period of twelve hours, the corresponding speed on the run being 21.5 knots. Engines of this vessel are shown in an engraving which appears on this page and which was reproduced from Engineering of London. These engines are of the twin-screw triple-expansion type, with cylinders $41\frac{1}{8}$ inches, $65\frac{1}{8}$ inches and $105\frac{1}{8}$ inches in diameter by 54 inches stroke. The low pressure cylinders are fitted with double-ported TricK slide valves, balanced by means of relief rings at the back; whilst the high pressure and intermediate cylinders have piston valves. In the case of the latter cylinder the valves are double, both spindles, however, being connected to a single crosshead. Steam reversing and turning gears are provided, the former having an all-round motion. The engines

A Story of Industrial and Commercial Activity.

Several articles pertaining to lake commerce that have of late appeared in leading trade journals and daily newspapers throughout the United States are commendable on account of the accuracy of statements which they contain. In the Scientific American of recent date there is a group of illustrations well calculated to convey an idea of the extent of lake shipping. A carefully prepared article dealing generally with the subject is prefaced with the following paragraph:

"The story of the development of trade on the great American lakes is one of the most remarkable in the wide domain of industrial and commercial activity. In the four score years which have elapsed since the inauguration of steam navigation on this great chain of inland seas, the growth of the shipping interests has at all times been constant, and in recent years the increase in the volume of traffic has been truly marvelous. When the settlement of the great northwest had opened up its vast store-houses of agricultural and mineral wealth, the farmer and the miner found ready at hand in this noble waterway a cheap and easy route for the transportation of their products to eastern markets. The growth of the



TRIPLE EXPANSION ENGINES OF THE IMPERIAL YACHT STANDART.

take their steam at a pressure of 165 pounds per square inch from a battery of twenty-four Belleville boilers working at a pressure of 245 pounds per square inch, the steam being passed through reducing valves before reaching the engine stop valves. The crankshaft is hollow, the external diameter being $17\frac{1}{2}$ inches and 18 inches, and internal diameter 8 inches. The main condensers are cast in one with the back columns of the low pressure and intermediate cylinders, the circulating water being supplied by means of two independently-driven centrifugal pumps.

Capt. L. E. King and J. H. Norton have opened an office at Nos. 503-504 Torrey building, Duluth, and will conduct a general vessel and insurance agency under the firm name of J. H. Norton & Co., making a specialty of buying and selling vessels and tug property. They recently sold the steamer Bon Voyage for the Thousand Island-Ogdensburg Transportation Co. to Captains B. F. and J. G. Howard of Duluth; also the tug W. W. Richardson to Capt. Joseph Lloyd, Sr., for John E. Mills, and they chartered the tug Violet H. Raber to the Cranberry Lumber Co. for Raber & Mueller of Chicago. The Bon Voyage is said to have sold for about \$30,000. She will be run between Hancock, Duluth and intermediate points. She is 168 feet long, 30 feet beam and $10\frac{1}{2}$ feet deep. She was built in Saugatuck, Mich., in 1891.

Charts of Georgian bay will be required by most of the captains of vessels of the medium class during the coming season, on account of the increasing traffic in that direction. The Marine Review has in stock at all times the best charts of Georgian bay that are made.

fleet of vessels on the lakes has kept pace with, if it has not anticipated, the growth of the flourishing cities which line their shores, until today we are met with the curious spectacle of a maritime nation with a seaboard that confronts two oceans for thousands of miles possessing a larger tonnage upon its rivers and lakes than it does upon the high seas. While it is true that the volume of trade on the lakes is largely due to the advantageous location of this waterway in regard to the natural flow of traffic, much credit is due to the energy with which the facilities of travel have been enhanced by the efforts of the engineer and the capitalist, and by the fostering care of the government of the United States. The efforts of the capitalist are manifest in the construction of special types of vessels suited to the requirements of traffic on those inland seas and in the vast and excellently equipped docks and loading facilities which abound at all principal points. The hand of the government is seen in the deepening of channels, the improvement of harbors and the construction of canals where natural obstacles limit or absolutely prevent the passage of vessels."

Engineers who have been appraising the plants included in the wire consolidation are said to have practically completed their work, and it is understood place the valuations close to those set by the owners upon their property. This is interpreted as being favorable to the success of the plan. Practically all the preliminary work is now done and the final negotiations are progressing, so that possibly a few days may bring the announcement of their consummation. There may be some delay, however, since the leader of the financial syndicate is absent.

Deep Waterways Appropriations.

It would seem that the work of the Deep Waterways Commission, composed of Major C. W. Raymond, U. S. A., Geo. Y. Wisner of Detroit and Alfred Noble of Chicago, is to be far more extensive than was at first expected. When this commission was appointed by the president in July last there was an appropriation of \$150,000 on hand for its use. This appropriation will be exhausted with the close of the present fiscal year, June 30 next, and the commission, through the war and treasury departments, asks for another appropriation of \$250,000. The letter of Major C. W. Raymond to Secretary Alger on the subject of a further appropriation is as follows:

"I have the honor to invite attention to the desirability of an appropriation by congress for continuing the work now in progress under the board of engineers for deep waterways during the fiscal year ending June 30, 1899. It appears that no estimate for continuing this work was included in the estimates submitted to congress. The sundry civil act approved June 4, 1897, contains the following provision: 'For surveys and examinations (including estimate of cost) of deep waterways and the routes thereof, between the great lakes and the Atlantic tidewaters, as recommended by the report of the Deep Waterways Commission, transmitted by the president to congress Jan. 18, 1897, \$150,000. Such examinations and surveys shall be made by a board of three engineers, to be designated by the president, one of whom may be detailed from the engineer corps of the army, one from the coast and geodetic survey, and one shall be appointed from civil life.'

"The board of engineers thus provided for was designated and appointed by the president on July 28, 1897. Before it was organized and prepared for work the time for submitting estimates had passed, and therefore no estimates were submitted to the war department. The duties imposed upon the board by congress are fully set forth in the conclusions and recommendation of the Deep Waterways Commission of 1897. Attention is respectfully invited to these conclusions and recommendations on pages 29 and 30 of the report of that commission, transmitted to congress by the president on Jan. 18, 1897. Briefly stated, these duties are to survey, examine and investigate certain projects for deep waterways from the head of Lake Superior to tide water in the Hudson river, and to prepare plans and estimates of cost for the same. The commission estimated the cost of the complete execution of this work at not less than \$600,000. It will be observed that the board is not charged with the duty of advising congress as to the necessity or desirability of the practical construction of any of these waterways. Its duty is simply to obtain accurate and full information with reference to routes, methods, plans and cost of construction, upon which the future action of congress may be confidently based. In organizing and conducting these surveys and investigations, the board has considered accuracy and thoroughness to be essential conditions; and since the cost of administration and supervision is always a large element in this kind of work, it has carried on its operations with the greatest possible rapidity. The plans of the board contemplate the expenditure of the entire appropriation now available by the end of the current fiscal year.

"After careful consideration, the board is of the opinion that the sum of \$225,000 can be profitably expended upon the work committed to its charge during the fiscal year ending June 30, 1899. If a smaller sum is appropriated, the cost of administration and supervision for the whole work will be increased. In view of these facts, I have the honor to request that an estimate of \$225,000 for making surveys, examinations and investigations under the direction of the board of engineers on deep waterways, as provided for by law, be submitted to congress for its consideration. The board will be glad to submit full information regarding its work, plans and estimates, either verbally or in writing, to the department or to the committees of congress, should such information be desired."

Why We Do Not Reduce Foreign Indebtedness.

There is no appreciable reduction in the foreign indebtedness of the United States, and this notwithstanding that each year we send abroad commodities between \$300,000,000 and \$400,000,000 more valuable than we purchase from abroad. When we consider, though, that we are paying to foreigners something like \$300,000,000 a year in freight charges for carrying our imports and exports it is not at all difficult to understand why it is that we fail to reduce our foreign indebtedness. For many years Great Britain has been exporting several hundred millions of dollars' worth of products less than she imports. From such an adverse balance of trade most nations would soon become bankrupt. Of recent years this adverse balance has averaged from \$500,000,000 to \$800,000,000 annually. But Great Britain's ships, it is said, earn annually something like \$800,000,000, an item which in itself brings into the coffers of Great Britain more than the adverse balance paid out for imports, to say nothing of what she draws as a creditor nation from all the other nations of the world. If American ships did American carrying in the foreign trade the United States would be a creditor nation, too.—Commercial America, New York.

Commerce of Duluth and Superior.

If officers of the army engineer corps, who are in charge of river and harbor works on the lakes, would follow the rule adopted by Major Clinton B. Sears, United States engineer at Duluth, the problem of securing a full summary of reliable statistics pertaining to lake commerce would be settled. The river and harbor act of Feb. 21, 1891, contains a clause providing for the collection of statistics pertaining to commerce at all points where expenditure is made by the government for improvements. In accordance with this act, Major Sears, who found that the customs regulations do not admit of a full summary of commerce at any point on the lakes being prepared from the records of collectors, has insisted upon all vessels reporting their cargoes to representatives of his office when entering or leaving the bay that forms the Duluth-Superior harbor. These statistics show an immense gain in the commerce of Duluth and Superior during the past three years. The total value of this commerce in 1896 was \$16,676,900 in excess of 1895, and the gain in 1897

over 1896 was \$6,874,285. The following tables deal with the lake commerce of these two ports in detail:

CONDENSED STATEMENT OF COMMERCE AT THE HEAD OF THE LAKES, DULUTH AND SUPERIOR, DURING NAVIGATION SEASONS OF 1895, 1896 AND 1897.

	1897	1896	1895
Number of vessels arriving.....	4,864	5,527	5,505
Registered tonnage arriving.....	6,342,118	6,626,101	5,665,752
Number of vessels departing.....	4,894	5,421	5,481
Registered tonnage departing.....	6,503,747	6,726,967	5,778,520
Arrivals and departures, vessels.....	9,758	10,948	10,986
Arrivals and departures, tonnage.....	12,845,865	13,353,068	11,444,272
Receipts, net tons.....	2,492,420	2,407,880½	2,035,465
Value of receipts.....	\$28,963,122	\$27,717,561	\$27,443,512
Shipments, net tons.....	5,982,804	5,478,953	4,289,886
Value of shipments.....	\$89,588,063	\$83,959,389	\$67,556,488
Receipts and shipments, net tons.....	8,475,224	7,886,833½	6,325,351
Value of receipts and shipments.....	\$118,551,185	\$111,676,900	\$95,000,000

SUMMARY OF LAKE COMMERCE, DULUTH AND SUPERIOR, SEASON OF 1897.

	DULUTH		SUPERIOR	
	Net tons.	Valuation.	Net tons.	Valuation.
Receipts.....	885,623	\$16,378,660	1,606,797	\$12,584,462
Shipments.....	3,890,457	\$8,881,407	2,092,347	\$5,706,656
Receipts and shipments.....	4,776,080	\$55,260,067	3,699,144	\$63,291,118
Passengers arriving and departing.....	44,526		7,885	

LAKE COMMERCE OF DULUTH—RECEIPTS, SEASON OF 1897.

ITEMS.	Total.	Net tons.	Estimated valuation.
Anthracite coal.....	Tons. 239,472	239,472	\$1,137,492
Bituminous coal.....	Tons. 442,802	442,802	1,248,702
Lime stone.....	Tons. 17,957	17,957	22,446
Salt.....	Barrels. 142,858	20,408	92,858
Machinery.....	Tons. 351	351	87,750
Manufactured iron.....	Tons. 24,596	24,596	774,774
Kerosene oil.....	Barrels. 1,289	258	7,476
General merchandise.....	Tons. 123,378	123,378	12,337,800
Logs, 1000 ft.....	B. M. 79,290		555,030
Fish.....	Tons. 588	588	47,040
Cement and lime.....	Barrels. 53,841	10,768	53,841
Sand.....	Cubic Yds. 2,316	3,088	926
Building stone.....	Tons. 1,957	1,957	12,525
Passengers.....	No. 22,451		
		885,623*	\$16,378,660

LAKE COMMERCE OF DULUTH—SHIPMENTS, SEASON OF 1897.

ITEMS.	Total.	Net tons.	Estimated valuation.
Iron ore.....	Tons. 2,342,679	2,342,679	\$3,514,018
Copper.....	Tons. 6,727	6,727	1,345,400
Flour.....	Barrels. 3,560,829	356,083	11,572,694
Wheat.....	Bushels. 17,702,017	531,061	13,276,513
Other grains.....	Bushels. 7,006,572	175,164	4,203,943
Structural iron or steel.....	Tons. 385	385	16,940
Wool.....	Pounds. 4,595,483	2,298	505,503
Lumber, 1000 ft.....	B. M. 227,428	454,856	2,501,708
Shingles, M.....	Number. 13,125	1,641	13,125
Lath, M.....	Number. 1,018	255	763
Miscellaneous merchandise.....	Tons. 19,308	19,308	1,930,800
Passengers.....	Number. 22,075		
		3,890,457	\$38,881,407

LAKE COMMERCE OF SUPERIOR—RECEIPTS, SEASON OF 1897.

ITEMS.	Total.	Net tons.	Estimated valuation.
Anthracite coal.....	Tons. 434,604	434,604	\$2,064,369
Bituminous coal.....	Tons. 1,032,503	1,032,503	2,911,658
Building stone.....	Tons. 836	836	5,350
Salt.....	Barrels. 138,713	19,816	90,163
Machinery.....	Tons. 75	75	18,750
Manufactured iron.....	Tons. 39,664	39,664	1,249,416
Kerosene oil.....	Barrels. 118,998	23,800	690,188
General merchandise.....	Tons. 53,079	53,079	5,307,900
Logs, 1000 ft.....	B. M. 33,334		233,338
Cement and lime.....	Barrels. 7,982	1,596	7,982
Fish.....	Tons. 64	64	5,120
Sand.....	Cubic Yds. 570	760	228
Passengers.....	Number. 3,594		
		1,606,797*	\$12,584,462

* Not including logs.

LAKE COMMERCE OF SUPERIOR—SHIPMENTS, SEASON OF 1897.

ITEMS.	Total.	Net tons.	Estimated valuation.
Iron ore.....	Tons. 525,333	525,333	\$788,000
Copper.....	Tons. 44,345	44,345	8,869,000
Flour.....	Barrels. 4,418,366	441,837	14,359,689
Wheat.....	Bushels. 20,339,917	610,198	15,254,938
Other grains.....	Bushels. 13,232,016	331,300	7,951,210
Structural iron or steel.....	Tons. 136	136	5,984
Wool.....	Pounds. 8,343,350	4,172	917,768
Lumber, 1000 ft.....	B. M. 57,897	115,797	636,867
Miscellaneous merchandise.....	Tons. 19,232	19,232	1,923,200
Passengers.....	Number. 4,291		
		2,092,347	\$50,706,656

MOVEMENT OF VESSELS IN AND OUT OF HARBORS OF DULUTH AND SUPERIOR, SEASON OF 1897.

	Recorded at Duluth Canal.	Recorded at Superior.
Steam vessels entering.....	2,463	1,494
Sail and other vessels entering.....	657	250
Total vessels entering.....	3,120	1,744
Registered tonnage entering.....	3,982,795	2,350,323
Steam vessels departing.....	2,429	1,527
Sail and other vessels departing.....	680	258
Total vessels departing.....	3,109	1,785
Registered tonnage departing.....	4,021,678	2,482,069
Total entries and departures, vessels.....	6,229	3,529
Total entries and departures, registered tonnage.....	8,004,473	4,832,392
Average tonnage, exclusive of tugs.....	1,386	1,500

NOTE.—In all the foregoing tables valuation are based on average wholesale prices on board vessels for exports, and landed on docks for imports.

At the channel entrance known as the Wisconsin entry the record of vessel movements was as follows: Number of vessels entering, 632; registered tonnage of vessels entering, 844,000; number of vessels departing, 639; registered tonnage of vessels departing, 876,497; number of vessels entering and departing, 1,271; registered tonnage of vessels entering and departing, 1,720,497.

Howard Gould's Elegant Yacht Niagara.

Dispatches from Wilmington, Del., report an attendance of 5,000 people at the launch of Howard Gould's twin-screw steel yacht Niagara in that city on Saturday last. The yacht was christened by Miss Katherine Clemmons, the well-known actress, who has accompanied Mr. Gould on several trips to Wilmington while the yacht was on the stocks. The Niagara, which is being built by the Harlan & Hollingsworth Co., will not be of great speed, but she is the largest and finest yacht as yet built in this country. The vessel will fully demonstrate the ability of Americans to build as fine yachts as any nation, for when Mr. Gould decided to have a new boat he asked for plans from naval architects on both sides of the Atlantic. The plans prepared in this country met every requirement, and Mr. Gould decided to have his new vessel constructed in this country and selected the Harlan & Hollingsworth Co. as the builders; therefore the Niagara is not only American built but also American in design, and is constructed entirely of American material. Capt. W. G. Shackford of South Orange, N. J., an ex-Pacific mail commander, and formerly in charge of Jay Gould's yacht Atalanta, will command the Niagara, and is superintending her building. Her cost will be in the neighborhood of half a million. She will carry a crew of fifty men, and running expenses will probably approach \$10,000 a month.

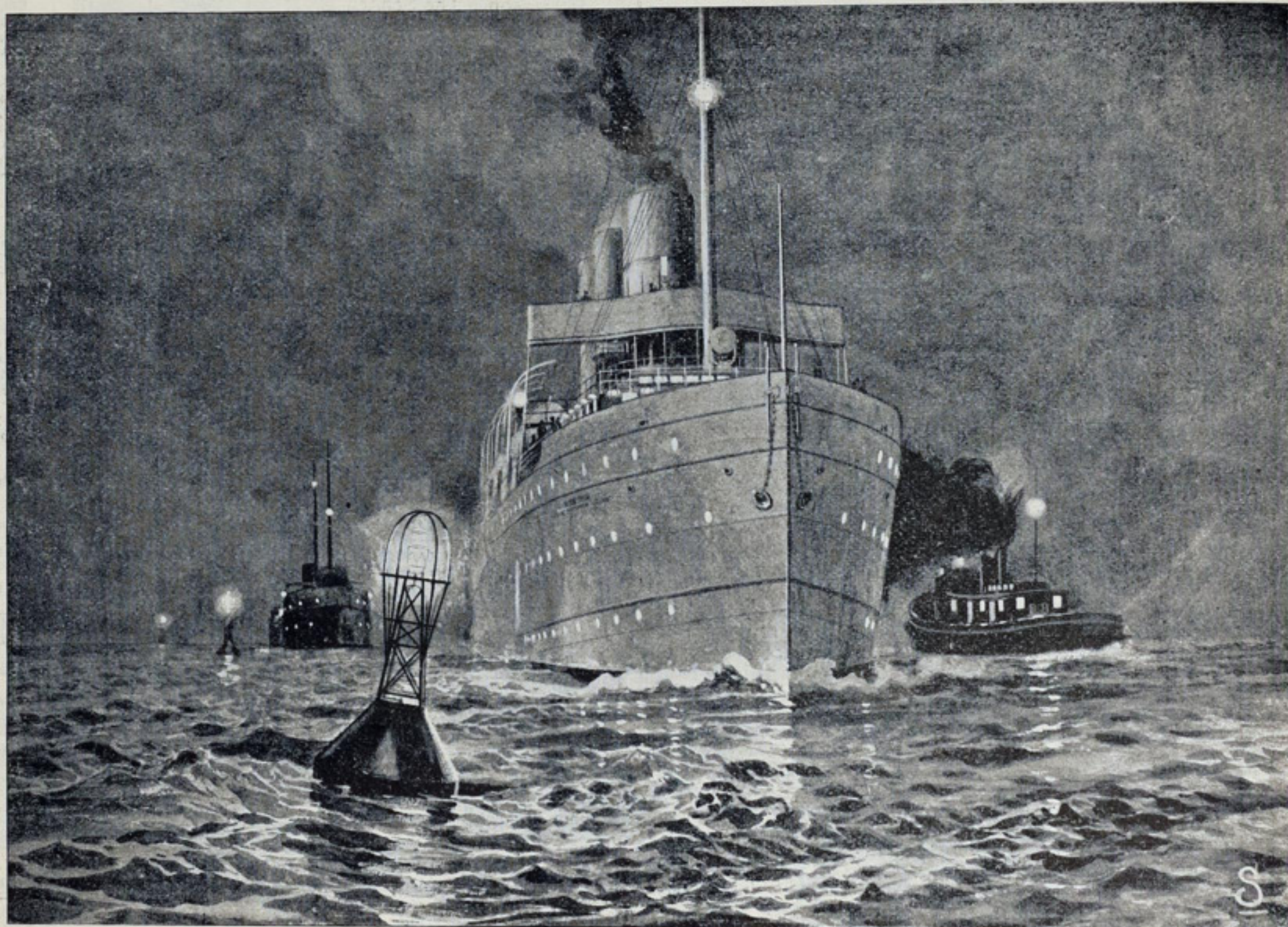
Dimensions of the Niagara are: Length over all, 270 feet; on the water line, 245 feet; beam, 36 feet. She is 28 feet from the spar deck and

storeroom. The crew's quarters are forward. The furnishing of the state-rooms will be done by Mr. Gould himself. Two dynamos will provide for electric lighting in all parts of the yacht, and there is also an electric storage plant. Eight handsome mahogany boats will swing from the davits.

Eophones for the Northern Line Passenger Steamers.

"Although not disposed to take up every new appliance that is suggested for ships," says a Buffalo correspondent, "the management of the Northern Steamship Co. is convinced that the eophone, an instrument designed to locate sound, will prove especially valuable aboard the passenger steamers North West and North Land, on account of the frequency of fogs and smoky weather on the lakes, and in view of the fact also that in the lake service vessels are constantly in danger of collision and in danger of running on shoals that may often be avoided by proper location of signals. Arrangements are now being made with the Eophone Co. of New York to equip the passenger steamers with these instruments. Signals from passing vessels, fog signals on shore, etc., are useless unless their exact position or direction can be located, a feat which has taxed the listening powers of vessel masters and pilots heretofore to the utmost and has often resulted in failure. The managers of the big passenger ships are determined to add everything to them that will contribute to the safety and comfort of passengers."

The eophone referred to in the foregoing paragraph is no longer an



NIGHT SCENE AT BALLARD'S REEF, DETROIT RIVER.

A narrow channel of about 17½ feet depth at this point in the Detroit river, dug through solid rock and boulders in most parts, is lighted by three gas buoys of the Pintsch type, of which there were some forty in use on the lakes last season.

20 feet deep from the main deck. Her lowest free board amidships is 13 feet and at the bows 18 feet. Her tonnage is 1,900. There are three decks. The main deck is of steel and is planked. There is also a double bottom, and bilge keels to lessen rolling in seaway, and the rig is of bark kind. Bulwarks of steel divide the vessel into many compartments and add to her safety. Engines are of triple expansion type, with cylinders 18, 28 and 45 inches diameter, and 30 inches stroke of piston. These engines will drive twin screws with steam supplied by three Scotch boilers, having a working pressure of 160 pounds, which will drive the yacht at a speed of 14 knots an hour. Her coal capacity is 400 tons, enough to take her across the Atlantic and back without recoaling.

The deck house, which has been given great attention, is of steel, covered with paneled teak. The captain's cabin and chart room will occupy the extreme forward end, with a pilot house on top. The social hall, next aft, is 32 feet long. A smoking room, next aft, is 12 by 16 feet. The after part of the deck house, which is 100 feet long, is the observation room, built with sides of glass, so that in wet weather the passengers can enjoy a view of the yacht's surroundings without being exposed to the elements. A lounging deck for the crew is 40 feet long and 36 feet wide. It is aft on the main deck and is fitted with large square windows, affording an abundance of light and air. The owner's stateroom, dressing room and bath are on the starboard side in the stern, and on the port side is a corresponding suite of four rooms for the use of guests, each having a bath. There are also a stateroom for the ship's doctor, a photograph room, linen lockers, brushing room, butler's pantry, two kitchens for owner and crew, dining room and library. On the lower deck are the quarters of the servants, maids, valets, laundry, hospital room, trunkroom and general

experiment. It has been adopted by officials of the United States revenue cutter service and the light-house service for a large number of their vessels and is also in use on several of the Atlantic liners. Mr. James Brody, marine superintendent for the Northern company, also speaks of several improvements that are to be made in the passenger steamers before the opening of the tourist season on the lakes. "We are arranging," he says, "to ventilate the dining rooms with an up-draft at the middle of the room, immediately aft of the forward spar, possibly using the spar itself as a ventilator. Being hollow and reaching to a considerable height, it would naturally create a strong up-draft. Perforations will be made in it at irregular intervals so as not to weaken it. Three large down-draft ventilators will also be placed to connect with the engine room and boiler trunks. Our experience in past seasons has been that there is an unnecessary heat in those compartments. By the introduction of ventilators this will be remedied. From top to bottom the boats will be thoroughly renovated. The after smoking room on the main deck will be abandoned and the additional space thrown into the buffet. The baggage rooms will also be changed somewhat, to allow more compact storage and ease of handling."

Detroit fire commissioners are preparing for the construction of another fire boat and will probably adopt a type of triple expansion pump suggested by the firm of Thomas Manning, Jr., & Co. of Cleveland. It is understood that the idea of a triple pump will also be adopted in a fire boat for which the city of Chicago will soon let a contract.

The Marine Review has the latest Georgian bay charts.

Appointments of Captains and Engineers.

Whitney, D., Jr., Detroit: Steamers—E. W. Oglebay, Capt. Wm. H. Hutcheson, Engineer Ed. Egan; Merida, Capt. John Ivers, Engineer Jas. Balfour; Tampa, John Leonard, Engineer Chas. Murett; Mecosta, Capt. A. C. May, Engineer Geo. Francomb; Lansing, Capt. Chas. Miner, Engineer Jos. Coveyeau; D. C. Whitney, Capt. Thos. Brady, Engineer Jos. Lacy; Nipigon, Capt. Ed. July, Engineer Chas. Francomb. Schooners—Ashland, Capt. Geo. Dennis; Wayne, Capt. A. M. Elliott; Melbourne, Capt. Geo. Cooper.

Union Steamboat Co., Buffalo: Steamers—Starucca, Capt. Walter Robinson, Engineer Henry Jordan; Ramapo, Capt. J. H. McDonald, Engineer Reynold Hill; Chumung, Capt. F. B. Huyck, Engineer George Fritche; Tioga, Capt. John Wulke, Engineer Charles Coushane; Owego, Capt. J. Byrne, Engineer Alexander Brown; H. J. Jewett, Capt. John Dugan, Engineer Albert Simpson; Rochester, Capt. George T. Morris, Engineer Nelson Johnson; New York, Capt. P. O'Neil, Engineer John Caul.

Fitzgerald, R. P. & Co., Milwaukee: Steamers—Philip D. Armour, Capt. F. D. Chamberlin, Engineer James Rossan; Wiley M. Egan, Capt. Fred. Howe, Engineer Fred. Coleman; R. P. Fitzgerald, Capt. Leslie E. Boyce, Engineer B. McNeill; John Plankinton, Capt. Lewis H. Powell, Engineer Wm. G. Fell; Denver, Capt. Peter Christenson, Engineer John Smith; Omaha, Capt. David Wilson, Engineer Chas. Bendschneider; Pueblo, Capt. Duncan Stalker, Engineer Aleck Staley; Topeka, Capt. John Tower, Engineer A. Wilcox.

Cleveland & Buffalo Transit Co., Cleveland: Steamers—City of Erie, Capt. John Edwards, Engineer J. G. Rendall, Pilot W. J. Willoughby, Steward J. M. Leishman, Purser A. D. McLachlan; City of Buffalo, Capt. W. H. Smith, Engineer A. Milroy, Pilot Geo. Ransier, Steward J. Barron, Purser C. W. Piner; State of Ohio, Capt. A. H. McLachlan, Engineer Chas. Lorimer, Pilot K. Finlasen, Steward W. Portwood, Purser —; State of New York, Capt. H. McAlpin, Engineer Wm. Steen, Pilot —, Steward H. Boyd, Purser D. McIntyre.

Detroit & Cleveland Navigation Co., Detroit: Steamers—City of Detroit, Capt. Alex. J. McKay, Engineer Wm. S. Huff; City of Cleveland, Capt. Archie McLachlan, Engineer John Sargeant; City of Alpena, Capt. Mathew Lightbody, Engineer A. Phillips; City of Mackinac, Capt. H. J. Slyfield, Engineer Wm. McDonald; City of the Straits, Capt. Duncan McLachlan, Engineer James Middleton.

Lake Superior Iron Co., Cleveland: Steamers—La Salle, Capt. Wm. Ames, Engineer Frank Steady; Joliet, Capt. Chas. Hinslea, Engineer F. B. Smith; Wawatam, Capt. Ed. Mooney, Engineer A. E. Bury; Griffin, Capt. Henry Peterson, Engineer J. F. Mahaney; Andaste, Capt. Emil Detlefs, Engineer W. H. Kennedy; Choctaw, Capt. Benson Fox, Engineer C. E. Walsh.

North Western Transportation Co., Detroit: Steamers—H. H. Brown, Capt. D. Girardin, Engineer John H. Hand; Fayette Brown, Capt. Jos. A. Powell, Engineer Nickolas Anderson; S. R. Kirby, Capt. John F. Jones, Engineer Wm. Watts; E. M. Peck, Capt. Thomas Beggs, Engineer Wm. Brake. Schooner—G. E. Hartnell, Capt. Alex. Callum.

Hutchinson, J. T., Cleveland: Steamers—Germanic, Capt. M. H. Place, Engineer G. W. Bedolph; Queen of the West, Capt. C. J. Debeau, Engineer P. Cain; Rube Richards, Capt. L. G. Vosburgh, Engineer J. C. Johnson. Schooners—E. C. Hutchinson, Capt. T. K. Woodward; May Richards, Capt. J. J. Martin.

Minneapolis, St. Paul & Buffalo S. S. Co., Buffalo: Steamers—Minneapolis, Capt. Wm. Jamieson, Engineer Bion St. Bernard; St. Paul, Capt. Jas. Jackson, Engineer John Davidson; Nebraska, Capt. Peter Thompson, Engineer Joseph Taylor; John Pridgeon, Jr., Capt. D. N. Sherwood, Engineer John Mogan.

Alger, Smith & Co., Detroit: Steamers—Volunteer, Capt. Wm. H. Rolls, Engineer P. B. McCabe; Gettysburg, Capt. S. H. Currie, Engineer W. P. Wenner. Tug—Torrent, Capt. Alex. Cattnach, Engineer J. M. Cronenweth.

Mathew's Line, Toronto, Ont.: Steamers—Niagara, Capt. Jas. Morgan, Engineer Thos. Mills; Clinton, Capt. John Joyce, Engineer J. Gray. Barges—Lisgar, Capt. J. Fahey; Grimsby, Capt. S. Atkinson. Schooners—Emerald, Capt. —; Clara Youell, Capt. W. J. Colwill.

Republic Iron Co., Cleveland: Steamers—Republic, Capt. E. T. Rattay, Engineer Wm. Lowe; Specular, Capt. Wm. Megarvey, Engineer John Smith; Continental, Capt. H. Rogers, Engineer —. Schooners—Magnetic, Capt. W. A. Black; Grace Holland, Capt. B. M. Landfair.

Milwaukee Tug Boat Line, Milwaukee: Steamers—Helena, Capt. Jas. Leisk, Engineer Scott Pratt; Neosho, Capt. W. E. Wright, Engineer J. McCaffrey; Veronica, Capt. O. J. Soleau, Engineer W. J. Riordan. Schooner—Amboy, Capt. W. R. Williams.

McVittie, A., Detroit: Steamers—Progress, Capt. Alex. Birine, Engineer Davis; Senator, Capt. E. B. McQueen, Engineer A. Carter; John F. Eddy, Capt. Jas. Mara, Engineer A. C. Bowen; Badger State, Capt. —, Engineer —; Empire State, Capt. —, Engineer —.

McKay, R. O. & A. B., Hamilton, Ont.: Steamers—Sir S. L. Tilley, Capt. Geo. Mackey, Engineer Jas. H. Brown; Lake Michigan, Capt. Wm. O. Zealand, Engineer Jos. Boulanger. Schooner—T. R. Merritt, Capt. Wm. A. Corson.

Curtis & Brainard, Toledo: Steamers—Cherokee, Capt. W. A. Ashley, Engineer Arnold; Mohegan, Capt. Wm. Hagan, Engineer Ragan. Schooners—Chippewa, Capt. John Davidson; Mingoe, Capt. A. Snelgrove.

Mona Transportation Co., W. W. Brown, Mgr., Cleveland: Steamer—Geo. Presley, Capt. C. D. Woodward, Engineer O. Schneider. Schooner—N. Reddington, Capt. Wm. Packer.

Jenkins, John, Marine City, Mich.: Steamer—W. H. Sawyer, Capt. John Jenkins, Engineer Nelson Gullett. Schooners—C. E. Redfern, Capt. Wyman Powers; A. C. Tuxbury, Capt. J. C. Angell.

Peterson, J. D., Huron, O., for Geo. W. Brown, managing owner, New York: Steamer—J. C. Lockwood, Capt. J. D. Peterson, Engineer Geo. W. Curtis.

North West Transportation Co., Sarnia, Ont.: Steamers—Monarch, Capt. E. Robertson, Engineer E. W. McKean; United Empire, Capt. John McNab, Engineer S. Brisbin.

Fleming, P. H., Chicago, Mgr. of Lake Line, B. & O. Ry.: Steamers—Ira H. Owen, Capt. J. Q. Owen, Engineer Hugh Buchanan; Parks Foster, Capt. Geo. E. Merrit, Engineer P. Marceaux.

Johnson, H. J., Cleveland: Steamer—H. J. Johnson, Capt. Chas. Miner, Engineer John Seymour. Schooner—Helvetia, Capt. Chas. Miner, Jr.

Buckeye Steamship Co., Capt. C. L. Hutchinson, Mgr., Cleveland: Steamer—City of Glasgow, Capt. John McNeff, Engineer C. R. Price.

Kelley Island Lime & Transport Co., Cleveland: Steamer—A. Y. Gowen, Capt. Chas. Smith, Engineer Chas. C. Smith.

Ohio & Pennsylvania Transportation Co., Cleveland: Steamer—Alcona, Capt. W. T. Sutherland, Engineer A. McGregor.

Roby Transportation Co., Detroit: Steamer—L. C. Waldo, Capt. John Duddleson, Engineer J. Collins.

Miller, J. B., Toronto, Ont.: Steamer—Seguin, Capt. J. B. Symes, Engineer Samuel Gillespie.

Steel Cars for Coal and Ore.

Powerful locomotives and steel ore cars will cut an important figure in trade between Lake Erie ports and the furnaces during the coming season. The Schoen Pressed Steel Co. of Pittsburg now has on its books orders for 1,190 steel cars to be delivered by June 1. Of these 400 are for the Pittsburg, Bessemer & Lake Erie and 100 for the Pittsburg & Lake Erie. The latest orders were those of the Pittsburg & Western for 450 cars and the Pennsylvania Co. for 200. The cars for the Pittsburg & Western road are similar to those now used on the Bessemer line, but longer, heavier and stronger. They are 30 feet long, 105 inches high from the top of the rail, with a bed over 6 feet high, and each weighing 33,000 pounds empty. Each car is designed to carry a coal load of 90,000 pounds and ore load of 110,000 pounds. The sides will be of quarter-inch plates, and the bottoms and angles much thicker. These cars will be used between the Pittsburg and Mahoning valley furnaces and the Fairport docks. It is estimated that trains of forty cars can be easily handled by the heavy engines in use. The 200 cars ordered for the Pennsylvania lines will be the largest and strongest cars. They will be similar in design to the Bessemer cars, except that they will be 32 feet long and 10 feet high above the rail. They will each weigh 35,000 pounds and are designed to carry 100,000 pounds of coal and 110,000 pounds of ore.

Erie-Buffalo Passenger Service.

Immediately following the order of directors of the Cleveland & Buffalo Transit Co. to have the steamers of that line trade to Erie next season comes the announcement from Detroit of a contract for a side-wheel steamer to be built especially for passenger and freight service between Erie and Buffalo. The company, which is capitalized at \$140,000 (about the cost of the new steamer) was formed by E. H. McFall, manager of the Sandusky steamer Arrow. Associated with Mr. McFall are Capt. G. A. Brown of Sandusky, who is master of the steamer Arrow, and Messrs. E. D. Carter and Louis Streuber of Erie. The steamer, for which a contract has been closed with the Detroit Dry Dock Co., will be similar to the Frank E. Kirby but will be a little higher out of the water. Dimensions are 205 feet long over all, 190 feet keel, 12½ feet deep and 25 feet beam. Engines will be of the vertical beam type and with large boilers, supplemented by Howden hot draft, it is expected that she will be capable of making 21 statute miles in an hour. The vessel will not be completed until the spring of 1899. When in regular service she will leave Erie at 7 a. m., reaching Buffalo by noon, and returning to Erie about 7 o'clock in the evening. Large excursions from along the lines of the Pennsylvania Co. may be arranged at Erie, and as the new steamer will furnish a daylight trip to Niagara Falls, it is expected that this excursion business will add materially to the regular patronage of the new steamer between Erie and Buffalo. The steamer will be designed to carry about 1,200 excursionists.

Furnace Capacity Completely Engaged.

The furnace capacity of the central west (territory supplied entirely by lake ores) was never so actively engaged as at present. The Pittsburg district has only one idle furnace, which is out for repairs. In the Juniata and Conemaugh district the Cambria Iron Co. has only one furnace out of blast, and the only other really modern stack in the district, now out for repairs, is the Everett. The Rebecca in western Pennsylvania is banked. In the Shenango valley the Douglas, Ella and Fannie represent available capacity rated at 2,660 tons weekly. Every stack in the Wheeling district is running. The same is practically true of central and northern Ohio, where only the Seneca furnaces are out. In the Mahoning valley the Phoenix is the only furnace not running, and in the Chicago district the Calumet alone is not producing. In the northwest the Minerva and West Duluth are idle. Even if it were possible to start all of those enumerated—which it is not—their aggregate tonnage would not foot up to more than 9,000 tons per week. We doubt whether one-half that tonnage could possibly be dragged into the ranks of producers under the most favorable circumstances, and even then any trouble in any of the great producing centers would at once neutralize such an accession. When it is considered that the central west, including the Hanging Rock region and Missouri, was producing on Feb. 1 at the rate of 158,000 tons per week, or say 675,000 tons per month of thirty days, it will be appreciated how completely the furnace capacity is engaged. It cannot be increased by 3 per cent., and for some time 700,000 tons per month could not be reached.—Iron Age.

Charts of the lakes made by the British admiralty; charts made by the United States hydrographic office, navy department, and charts made by the engineer corps of the United States army are all kept in stock by the Marine Review, 409 Perry-Payne building. All of them are corrected to date, and prices represent simply the cost of paper and press work.



DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

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The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

	Number.	Gross Tonnage.
Steam vessels.....	1,792	924,630.51
Sailing vessels and barges.....	1,125	354,327.60
Canal boats.....	416	45,109.47
Total.....	3,333	1,324,067.58

The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891	Number.	Gross Tonnage.
1891.....	204	111,856.45
1892.....	169	45,968.98
1893.....	175	99,271.24
1894.....	106	41,984.61
1895.....	93	36,352.70
1896.....	117	108,782.38
Total.....	864	444,216.36

ST. MARY'S FALLS AND SUZ CANAL TRAFFIC. (From Official Reports of Canal Officers.)

	St. Mary's Falls Canals.			Suez Canal.		
	1896*	1895*	1894	1896	1895	1894
Number of vessel passages.....	18,615	17,956	14,491	3,409	3,434	3,352
Tonnage, net registered.....	17,249,418	16,806,781	13,110,366	8,560,234	8,448,383	8,039,175
Days of navigation.....	232	231	234	365	365	365

*1895 and 1896 figures include traffic of Canadian canal at Sault Ste. Marie.

At the recent annual meeting in Duluth of the various mining and other companies going to make up the Lake Superior Consolidated Mines (Rockefeller properties) the only change was the substitution of the name of George D. Swift, local treasurer for the Rockefeller interest, for that of H. C. Merritt. This change affords one of the Duluth correspondents an opportunity to cast a parting shot at the Rockefeller management in the following dispatch referring to the meetings of the mining companies: "H. C. Merritt is the last of the family of Merritts who have had more or less happy connection with Mr. Rockefeller since his entrance into the field of Mesaba mining. At the same time the plant of the West Superior Iron & Steel Co., held by a master under a debt of nearly \$1,800,000, was bid in at a fixed price of \$60,000 by the representative of the bondholders, who will turn it over to a new concern, the Wisconsin Steel Co., for future disposition. Now that the bondholders, largely John D. Rockefeller, have secured this property, it is well enough to state, in passing, that the plant is actually worth hardly a tithe of what it has cost them. Too small for any economical use and without essentials of success, it is almost a mystery where the money went that the outfit is supposed to represent. Certain gentlemen who now have no connection with Mr. Rockefeller were, at the time this plant was built, assistants of his, and were interested, it is generally supposed, in town site sales in the immediate neighborhood of the works." The ideas of correspondents at the head of the lakes are evidently quite flexible in matters of this kind. Not long ago this same West Superior steel plant was to be the nucleus of a great steel industry at the head of the lakes that would outstrip the greatest achievements of manufacturers in the Pittsburgh or Mahoning valley districts.

In the last congress the vessel interests of Buffalo and Tonawanda put up a very strong opposition to a bill authorizing the construction of a bridge across Niagara river at Grand island. The measure was defeated, largely on the claim that the proposed bridge was a part of a real estate scheme. It would seem that this matter has been neglected by the vessel interests in the present congress, as a dispatch from Washington reports that the secretary of war has given approval to a bill similar to the one that failed of passage some time ago. The dispatch adds that Major Symons, United States engineer at Buffalo, feels convinced that there is a real necessity and demand for a bridge for local travel to connect Grand island with the main New York shore. He says the location desired by the people of Grand island is the most direct and convenient route to Buffalo; also that the general benefit resulting from it will far more than counterbalance the slight detriment that it may be to commerce in the river. The present bill provides that work upon the proposed bridge shall be commenced within one year and completed within four years from the date of passage.

This compliment to the management of the Chicago Ship Building Co. is clipped from the last issue of the Marine Journal, New York: "Those who are not aware of the splendid ship building facilities at some of the yards of the great lakes would be equally as surprised on inspecting them as was Mr. Yarrow, the famous English torpedo boat builder, on his recent visit. So interesting were Mr. Yarrow's expressions of surprise and pleasure after coming east again on his way home that the president of the Chicago Ship Building Co., W. L. Brown, received one

day a telegram from A. J. Forbes-Leith of the Illinois Steel Co., New York, saying: 'I am told Mr. Yarrow, the English ship builder, had been all over this country and reported the best equipped ship building concern, with the best tools which he desired to copy, was the Chicago Ship Building Co. I think you and Babcock will be glad to hear this.' The Mr. Babcock referred to is W. I. Babcock, manager of the Chicago Ship Building Co., to whose ability very largely the success of the concern has been due."

The White Star liner Cymric, now in New York, is the biggest cargo steamer in the world, and unlike other great twin-screw freighters of the White Star fleet, also has the distinction of being a passenger ship on a limited scale. She has first-class accommodations for about 100 cabin passengers. All the staterooms are on the promenade deck, and are so situated and furnished as to be as convenient as the ordinary bedrooms of a hotel. She will be a trifle faster than the other freighters of the line, which cover the distance between New York and Liverpool in ten days. She is 600 feet long over all, 64 feet wide and 42 feet deep. She measures 12,340 tons gross, and her power is supplied by two quadruple expansion engines. It is expected that her boilers will withstand a working pressure of about 200 pounds to the square inch. She is the thirty-sixth ship built for the White Star line by Harland & Wolff of Belfast. Besides her large cargo and dead meat carrying capacity, she will be able to take on the middle and upper decks 830 head of live cattle.

A financial statement submitted to stockholders of the Richelieu & Ontario Navigation Co. at the annual meeting in Toronto, a few days ago, showed net profits for last year of \$108,130, out of which two semi-annual dividends of 3 per cent. each on the capital stock had been paid, amounting to \$81,000, leaving a surplus of \$27,130. The total assets of the company, including steamers, real estate, etc., is \$2,324,082. This is the company for which the Bertram Engine Works of Toronto is building a large side-wheel steamer for St. Lawrence river service and for which a second steamer will be built later, to be ready for the season of 1899. The steamer that is to be ready for service next season will be named Ontario. No change was made in officers or directors.

Promoters of the St. Clair and Lake Erie ship-canal, which it is claimed will shorten the distance between Lake Erie and Lake St. Clair by 79 miles, are again trying to secure assistance from the Canadian government. Members of parliament from the Canadian districts bordering on the St. Clair and Detroit rivers are aiding the canal company. The construction of a canal to parallel the natural waterways connecting Lakes St. Clair and Erie seems ridiculous from a commercial point of view, and yet the leaders in this scheme are in all earnestness asking the dominion authorities to guarantee interest at 3 per cent. for twenty years on an issue of \$5,500,000 worth of bonds.

Lake dredging concerns are now reaching out to the Pacific coast in their search for big government contracts. When Major Charles E. L. B. Davis of the United States engineer corps opened bids at San Francisco, a few days ago, for construction of the San Pedro harbor breakwater, a job involving 136,020 long tons of stone in foundation, 1,933,603 tons in substructure, 221,025 tons in superstructure, and 2,370 cubic yards of concrete work, it was found that proposals had been submitted by Knapp & Gillen of Racine, Wis., Hingston & Sylvester of Buffalo, Heldmeier & New of Chicago, and Griffiths & McDermott of Chicago.

New engines that are now going into service on the Pittsburg, Bessemer & Lake Erie Ry. (Carnegie ore road) weigh in working order 168,000 pounds, or 84 tons. Engines of this type are capable of moving long trains of ore and coal cars of the largest kind, and when applied to the service between Lake Erie ports and iron furnace districts, they will add largely to the efficiency of the railways. The Pennsylvania Co. is also assigning some of these mogul engines to its lake service.

Although the make of pig iron throughout the country on Feb. 1 was at the rate of 228,338 tons per week, the increase in stocks does not indicate a great difference between production and consumption. Stocks on Feb. 1, exclusive of amounts held by steel works that produce their own iron, aggregated 776,284 tons, against 736,366 tons on Jan. 1 and 723,885 tons on Dec. 1.

Capt. W. G. Hall, one of the best-known ship builders of the Pacific coast, died at his home in San Francisco a few days ago.

Chicago Ship Building Co.'s Record.

Editor Marine Review:—In a late issue of your valuable paper we find an article in reference to the amount of tonnage turned out by any one yard on the lakes in one year, and a list of the product of one particular yard, which, although not so directly stated, is apparently given as the record. We therefore beg to say that in the year 1896 we launched and completed vessels with a total gross tonnage of 26,652.20 tons as follows:

Vessels.	Gross Tonnage.
Barge Manda	3,256.09
Barge Martha	3,256.09
Barge Geo. E. Hartnell.....	3,265.50
Steamer Geo. N. Orr.....	2,872.71
Steamer Maricopa	4,223.52
Barge Magna	3,259.43
Barge Geo. H. Corliss.....	3,259.43
Barge Alfred Krupp	3,259.43

26,652.20

Chicago, Ill., Feb. 21, 1898.

W. I. BABCOCK, Manager,
Chicago Ship Building Co.

Divers in the English Navy.

Divers in the British navy are usually selected from the best class of sailors. They are blue jackets who give time to special training for diving work at the dock yards of Portsmouth and other naval centers. Extra pay tempts the sailors to prepare for this special service. Their extra pay is two pence a day regularly, and an allowance of half a crown the first hour and eighteenpence every subsequent hour when actually engaged in diving. Although great care is taken to prevent men who are not strong in wind and limb and head from joining the service, it is not every sailor who can stand the strain of diving. There are few occupations which call for such a strong constitution—a heart with a lusty sledge-hammer-like beat being absolutely essential, because of the enormous pressure on a man when he is below the water. Divers are necessarily weighted. Each diver, in fact, carries back and forth about 80 pounds. His boots, which are made of thick leather and have leaden soles, weigh 20 pounds each, and the helmet, a surprisingly ingenious construction, with air pipes and valves so as to facilitate easy breathing and to enable all vitiated air to escape, weighs about 40 pounds. A diving outfit is an expensive matter; it costs as much as \$700. Every vessel in the navy, except small torpedo boats and destroyers, carries at least one diver, with a couple of dresses and complete apparatus, and on big warships there are often as many as four divers. There are ordinary divers, namely, specially trained bluejackets; and there are also mechanical divers—men who can not only go below the water and ascertain if anything is wrong with the hull or propellers or other outside machinery, but who are able to repair any damage, without necessitating the docking of the ship. These men begin as apprentices in the royal dock yards, and after becoming expert dock yard mechanics, volunteer for sea service, and if strong enough for the work and their tastes lie in that direction, qualify as divers.

It would be sheer foolhardiness for any man to be permitted to act as diver until he was accustomed to going below the surface, and was fully acquainted with the complicated dress that he has to don. A diver carries his life in his hand when he disappears down the ladder at the boat's side into the sea, and sinks it maybe as low as 20 fathoms, a matter of 120 feet, below the surface of the water. When it is remembered that the pressure on a man increases the further he goes, it will be understood how trying this occupation is. No man has ever gone lower than about 200 feet, and at that depth the pressure was over 88 pounds to every square inch. Many men who don the diving dress for the first time are rendered quite ill. Even those who come of strong stock will after a short time below signal to the diving party above to be raised, and will emerge from that heavy suit with mouth and ears bleeding profusely, with a buzzing in the head, and showing other signs of physical discomfort. Much depends on the care and constant watchfulness of the party at the surface, consisting of seamen and other ratings under charge of a warrant officer. These men have charge of the pumps for forcing air below in just sufficient quantities to meet the requirements of the diver. In a word, they hold his life at their mercy absolutely, and hence, by the admiralty regulations, if a diver has any reason for dissatisfaction he may at a moment's notice refuse to go on with the work; but then he is never permitted to act as a diver again. The object in view in framing this regulation is, of course, that every man who dives shall do so of his own free will, and not because he has made any agreement with the naval authorities. At any time if he does not like his job he may throw up the work.

A Giant Electric Light.

The government has finally decided to place the giant electric light, which was purchased some time ago for \$10,000,000 from Henry Leponté of Paris, at the Navesink Highlands, just south of Sandy Hook. This is the light with which officials of the light-house service have been carrying out a series of experiments at the Tompkinsville (Staten island) station. It is powerful enough to be seen 100 miles away if placed at a sufficient eminence to avoid the usual horizon line; but at the Highlands it will be visible to mariners 50 miles at sea, which is considered far enough for all practical purposes, and its light will be cast for the most part far above the masts of vessels anywhere near the coast. This light has what is called a two-range lens, 9 feet in diameter. Behind the lens is an arc light of special construction that requires carbons $1\frac{1}{2}$ and 2 inches in diameter. This light is supplied with an alternating current of electricity of 55 volts and 100 amperes. Each emergent beam is calculated to be of fully 90,000,000 candle power. The lens is revolved by clockwork that gets its motive power from a 100-pound weight. It is to flash every 5 seconds, a revolution being made every 10 seconds. The whole weight of the light rests upon a foundation of mercury contained in a circular tank about 2 feet deep, the object being to allow of the turning to give the flash every 5 seconds with the least possible friction. By using this method, it is said that the 20 tons of machinery can be made to revolve by the mere pressure of a finger; though, of course, the revolutions are to be controlled by the machinery so as to make them exactly in the time prescribed; that is, to give twelve flashes to the minute.

A Denial from Leo Bernard.

Editor Marine Review:—The Sault News, issue of Feb. 12, connects my name with an article complaining of the treatment accorded private light-keepers and Sault river pilots by lake vessel men. This article, so far as I am concerned, is false and unauthorized, and I will be very much obliged to you if you will say in your paper that I shall maintain my ranges this year the same as usual, and that I am satisfied with the treatment accorded me by the marine interests. I had nothing whatever to do with the publication of the article and wish the shipping interests to know it.

LEO BERNARD.

Sault Ste. Marie, Mich., Feb. 16, 1898.

"Soo" River Pilot.

Shell plates in the new Scotch boilers that are being fitted in the Plant line twin-screw steamer La Grande Duchesse at Newport News are $1\frac{1}{8}$ inches thick. There are two double-ended boilers, 15 feet 3 inches diameter and 20 feet long, and two single-ended boilers, 15.3 feet diameter and 11 feet long, all built for a working pressure of 210 pounds, with Ellis & Eaves draft.

Expenditures for Waterway Improvements.

On the claim that New York collects about 66 per cent. of all the import duties paid to the government, and handles about 45 per cent. of the total exports, the newspapers and commercial bodies of the metropolis are endeavoring to secure another big appropriation from congress for harbor improvements. The discussion has drifted to a comparison of expenditures made for river and harbor improvements in all parts of the country, and some of the tables that have been prepared from records of the war department are interesting. Following is a detailed statement of the largest expenditures (up to the close of 1896) throughout the country since the work of improving rivers and harbors was undertaken by the government:

STATE	RIVER OR HARBOR.	AMOUNTS APPROPRIATED.
Alabama.....	Mobile harbor	\$3,593,630
Arkansas.....	White river	370,000
California.....	Oakland harbor	1,804,600
Connecticut.....	New Haven harbor.....	1,161,000
Delaware.....	Delaware breakwater	2,808,353
District of Columbia.....	Washington and Georgetown.....	2,746,500
Florida.....	St. John's river.....	1,711,000
Georgia.....	Savannah river and harbor.....	5,580,606
Illinois.....	Chicago harbor	2,331,005
Illinois.....	Illinois river	1,743,650
Indiana.....	Michigan City harbor.....	1,273,638
Iowa.....	Dubuque harbor	69,500
Kentucky.....	Kentucky river	2,281,155
Louisiana.....	Bayou Plaquemine	480,000
Maine.....	Portland harbor	873,977
Maryland.....	Baltimore harbor	3,721,030
Massachusetts.....	Boston harbor	3,024,196
Michigan.....	St. Mary's river falls and canal.....	10,841,765
Michigan.....	Sand Beach, Lake Huron.....	1,336,000
Michigan.....	St. Clair river and canal.....	901,717
Minnesota.....	Duluth harbor	902,299
Mississippi.....	Yazoo river	275,000
Missouri.....	St. Louis harbor.....	342,600
New Hampshire.....	Cocheco river	240,000
New Jersey.....	Raritan river	665,213
New York.....	Buffalo harbor	2,861,480
New York.....	Buttermilk channel	496,350
New York.....	Hell Gate	4,385,361
New York.....	Gowanus bay	1,503,650
New York.....	Hudson river	3,091,038
New York.....	Harlem river	1,166,000
New York.....	Channel off Sandy Hook.....	1,795,000
New York.....	Hudson river opposite Jersey City...	25,000
New York.....	Oswego harbor	1,902,612
New York.....	Wrecks at Sandy Hook.....	116,530
New York.....	Newtown creek	227,500
North Carolina.....	Cape Fear river.....	3,485,478
Ohio.....	Cleveland harbor	1,833,631
Ohio.....	Toledo harbor.....	1,622,200
Oregon.....	Columbia Cascades	3,673,400
Pennsylvania.....	Erie harbor	921,867
Pennsylvania.....	Philadelphia harbor	3,241,000
Rhode Island.....	Providence river	820,750
South Carolina.....	Charleston harbor	4,277,200
Texas.....	Galveston harbor and bay.....	8,704,800
Texas.....	Sabine Pass	2,118,750
Vermont.....	Burlington harbor	601,922
Virginia.....	James river	1,772,500
West Virginia.....	Great Kanawha river.....	3,976,037
Wisconsin.....	Fox and Wisconsin rivers.....	3,377,831

It is claimed that the Mississippi river had had appropriated for improvements up to the close of 1896 the magnificent sum of \$52,821,125.73.

Mammoth Electric Plant.

Big contracts for electric lighting machinery are common with the General Electric Co. The Boston Electric Light Co. has concluded a contract with this company for the equipment of its generating station now in course of erection. Up to the present the Boston company has operated a number of stations throughout Boston. Two of these, however, have recently been abandoned to make way for the new railroad stations now being built, and the company has, therefore, decided to consolidate all the small stations into one mammoth generating plant, to be erected in South Boston.

The system will involve the use of the three-phase alternating current, selected on account of its greater flexibility and the fact that by its use the value of the present distributing system will not be diminished. The dynamos will be four in number, each of 1,500 K. W., with a reserve capacity of 50 per cent., giving a total output of 12,000 H. P. They will be of the revolving field type, a type adopted to permit a high voltage to be taken directly from the dynamo to the wires without the use of transformers to increase the pressure. The revolving field on each dynamo will be mounted on the shaft of an engine, and the voltage of the generated current will be 2,200 volts. To excite these dynamos, two smaller ones, each of 100 H. P., will each be driven by a synchronous motor. In addition eighteen large synchronous motors, each of 200 H. P., will drive thirty-six arc-lighting machines. Each motor will be set between two Brush 125-light arc dynamos, the shaft of the motor armature being extended to become the shaft of the armature of the arc dynamos. The power transmission for this arc-lighting plant, therefore, will be confined to the width of the dynamo room. If this system were not employed small engines would have to be used, whereas by the method selected only the large main engines will be employed. For the power circuits, that is, for the stationary motors, two rotary converters, each of 500 K. W., or 650 H. P., are included in the contract. These will take the three-phase alternating current and convert it into direct current at about 550 volts. For the incandescent lighting system, the three-phase current wires will simply be connected to the existing network, using the transformers now in use.

Around the Lakes.

A. Cartier is building a wooden harbor tug at Ashland, Wis. He will fit the vessel for fire service if the city officials or owners of dock property will bear the expense of pump equipment and maintenance.

Capt. Fred. C. Hart, who has managed the Owen vessels for several years past, will enter into active service again next season. He is to command the steamer J. Emery Owen, vice Capt. Marion Tinney.

C. W. Elphicke & Co. of Chicago have engaged Capt. D. H. Mallory, last season in the steamer G. G. Hadley, to command their steamer Geo. N. Orr. Capt. Mallory's successor in the Hadley is Capt. James O. Wood, formerly of the steamer Davidson.

Owners of the passenger steamer State of Michigan, which sailed last season between Toledo and the Straits under the title of People's Steamship Line, are figuring on extending the vessel's trips next season to Sandusky.

Drake, Bates & Co. of Cleveland have taken the sales agency for Brotherton ore. It is expected that the Brotherton, which is a Gogebic range property shipping from Ashland, will produce about 100,000 tons in 1898.

An effort is being made to secure a pension for Mrs. Jennie Mills of Port Huron, widow of Charles Mills, one of the volunteer crew which attempted to rescue the crew of the schooner William Shupe when she was stranded in Lake Huron.

Capt. Horace C. Thacher of the firm of Thacher & Breymann, submarine engineers and contractors, died at his home in Toledo last Friday morning of a complication of diseases growing out of an attack of grippe. He was fifty-four years old.

The O'Connor Transportation Co., with a capital of \$50,000, has been organized at Benton Harbor, Mich., to operate a freight and passenger steamer between that port and Chicago. The incorporators are Hugh, Peter J. and P. O'Connor, Jr., and Norman W. Gifford of Chicago, and Roscoe D. Farmer of Benton Harbor.

With a view to killing off outside weighmasters, the trustees of the Buffalo Merchants' Exchange have reduced the official weighmaster's fees from 15 to 12 cents per 1,000 bushels. On the basis of last year's receipts this reduction will represent a saving of about \$6,000 to vessels delivering grain cargoes at Buffalo.

It is said that the construction of the steamer Unique and her subsequent failure as a money-maker was the cause of the State Savings Bank at Marine City passing into the hands of George W. and Fred. T. Moore, bankers of Port Huron. The amount of money invested in the building of the Unique by the stockholders of the bank left that institution in financial straits.

Presque Isle is the name selected for the steel steamer building at the Lorain works of the Cleveland Ship Building Co. for Mr. W. G. Mather and others. A half interest in this steamer is owned by Jones & Laughlins, Pittsburg iron and steel manufacturers, and she will very probably be engaged in moving ore from Lake Superior mines in which members of that firm are interested.

Capt. Charles M. Swartwood, who died at his home in Cleveland on the 17th inst., sailed vessels of the Cleveland Rolling Mill Co.'s fleet during six or seven years past. He had not been in good health during the past two years. Capt. Swartwood followed the lakes from boyhood. His first command was the steamer Christie. From the Christie he went to the William Chisholm, of which he was captain for two years. In 1894 he was given command of the J. H. Wade, and remained in her until September of last year, when his illness was so severe as to cause him to leave his vessel.

Capt. W. R. Taylor, who was for a great number of years engaged as inspector for Canadian lake underwriters and whose son, T. R. Taylor, now holds the same position, is still living in Kingston and is hale and hearty at eight-seven years. Capt. Taylor is among the oldest of Canadian lake vessel masters now living. He began sailing out of Prescott, Ont., in 1832 in the steamer Queenstown and later in the steamer William IV. Between 1834 and 1869 he commanded, among other lake vessels, the steamer Cobourg, steamer Sir Francis Bond Head, schooner Thistle, schooner Shamrock, propeller St. Thomas, schooner Wm. Caley, schooner Governor, barge Superior, steamer Comet, schooner Annie Falconer and schooner Annie Minnes.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Feb. 19, 1898:

	Wheat, bushels.	Corn, bushels.
Chicago	9,376,000	16,077,000
Duluth	2,544,000	2,331,000
Milwaukee	130,000	123,000
Detroit	121,000	18,000
Toledo	264,000	488,000
Buffalo	1,034,000	1,365,000
	13,469,000	20,402,000

As compared with a week ago, the above figures show, at the several points named, a decrease of 374,000 bushels of wheat and an increase of 6,000 bushels of corn. On the same date there was afloat at Chicago 1,521,000 bushels of wheat, 6,666,000 bushels of corn, 232,000 bushels of oats, 131,000 bushels of rye and 93,000 bushels of barley; at Buffalo, 440,000 bushels of wheat and 84,000 bushels of rye; and at Milwaukee 1,099,000 bushels of corn and 214,000 bushels of oats.

Mr. Henry Cramp of the Cramp ship building company says in a letter to the Review: "In response to your inquiry as to whether there is any truth in the statements that you have seen to the effect that we are to build three twin-screw steamers for the International Navigation Co. to replace the Ohio, Illinois, Indiana and Pennsylvania, we remark that all such reports are, to say the least, premature."

Boilers for Steamships.

In all well-ordered ship building the construction of the boilers begins with the laying of the keel. In no department of ship building are skill and experience of more vital importance than in the boiler shops. There is, doubtless, wider difference in quality of boiler work and in consequent performance between different establishments than in any other branch of the art. Some shops turn out boilers which begin with first-class performance on the preliminary trial trip and maintain that standing throughout their period of duration; others begin with leaky tubes, sprung tube sheets and bad joints, and continue an unsatisfactory career until they land in the scrap heap at a time when a good boiler would be at its best. Slovenly work on a ship's hull may be remedied by thorough repair. Even imperfect construction or defective adjustment of the working parts of an engine may be corrected. But there is no salvation for a botched boiler, because one defect always breeds another. Steam at 160 pounds square inch pressure is an agent that will tolerate no trifling, and, hence, unless the boiler is perfect at the start in every detail, the cheapest disposition that can be made of it is to break it up and put in a new one that is perfect. The boiler in most common use for sea-going ships is of the cylindrical, fire tube type, with inside furnaces, and is usually termed the Scotch boiler. Other types are used, such as the "through and through" or locomotive boiler, and the water coil or tubulous type, of which there are many kinds. The essential difference is that in the cylindrical and locomotive types the fire goes through the tubes, which are immersed in water, while in the coil type the water is forced through tubes surrounded by fire. The great amount of water required in the Scotch boiler is rapidly bringing about a more extended use of the water tubular kind. The earlier water tube boilers did not have enough water to act as a heat reservoir, but the necessity for more water to insure uniformity of pressure is being recognized, and it is very probable that the coming boiler will be a tubular boiler with enough water in some large tube or tank to act as a water and steam reserve.—Lewis Nixon in Cassier's Magazine.

A Steel Lighter.

There is now being completed at the works of Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated, Morris Heights-on-the-Harlem, a steel steam lighter for the Erie Railroad Co. This is the first steel boat built for this service. It is 115 feet over all, 30 feet beam, 11 feet 6 inches depth, and 7 feet 6 inches draft. The hull is constructed entirely of steel with heavy beams and double plating on water line forward. There are five keelsons throughout entire length and nine forward. The frames are spaced 15 inches for a distance of 20 feet from bow, and the remainder have 21-inch centers. In general appearance this vessel will resemble the ordinary wooden lighter. The machinery will consist of a simple engine with cylinder 22 by 28 inches, fitted on bed stiffened with intercostals. Steam will be furnished by a shell boiler of about 600 horse power. In the construction of this craft the Erie company was represented by Capt. Cherry, superintendent of floating equipment, and Chief Engineer Dubois.

The Penberthy Injector Co. of Detroit, well known for several years past through extensive advertising as the manufacturers of a patent injector bearing the name Penberthy, have begun suit in Detroit for injunction and \$10,000 damages against the Lee-Penberthy Manufacturing Co., a new concern that has begun business in Detroit, and which, it is claimed, is infringing the trade name of the old company.



FOR SALE—The Steamer Unique—

Beyond question the fastest passenger screw steamer on the lakes, can be bought very cheap if bought soon. The Unique is in good condition throughout, excepting outside painting. A good title will be given. Printed description furnished on request. C. McELROY, Managing owner, St. Clair, Mich.

FOR SALE—STMR. ANDREW JOHNSON.

This side-wheel steamer, formerly of the Revenue cutter service, is for sale. She could readily be applied to passenger service. Her vertical beam condensing engine (48 inches diameter of cylinder and 9 feet stroke) has recently been thoroughly overhauled and is worth more than is asked for the ship. For particulars address RESERVE, 409 Perry-Payne Bldg., Cleveland.

U. S. ENGINEER OFFICE, Duluth, Minn., January, 31, 1898. Sealed proposals for dredging in Portage Lake Ship Canals, Keweenaw Point, Mich., will be received here until noon, February, 28, 1898, and then publicly opened. Information furnished on application.

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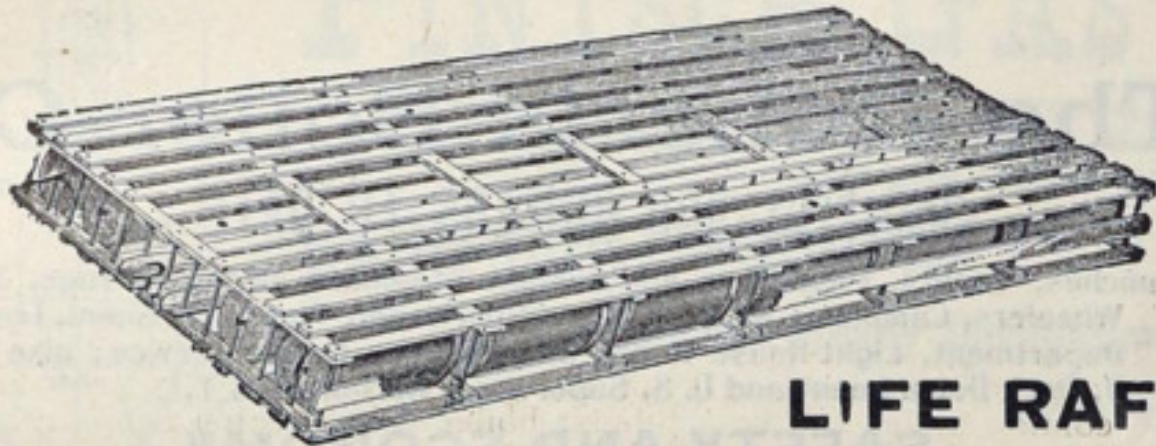
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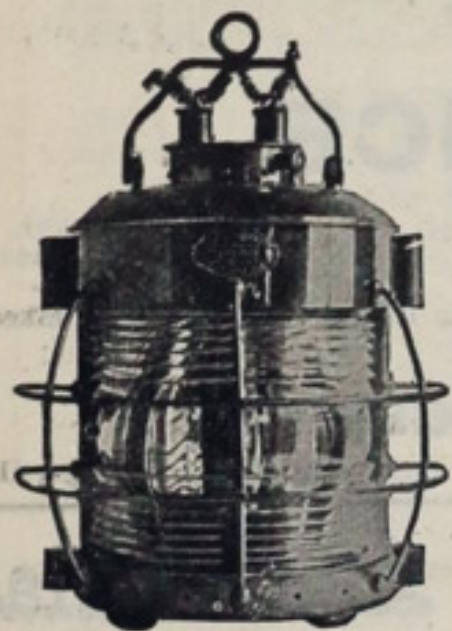
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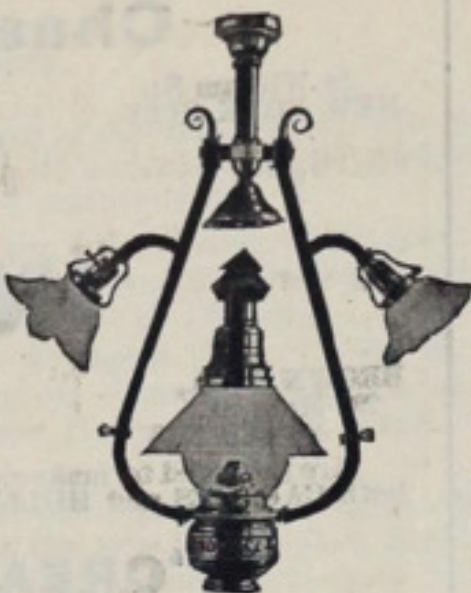
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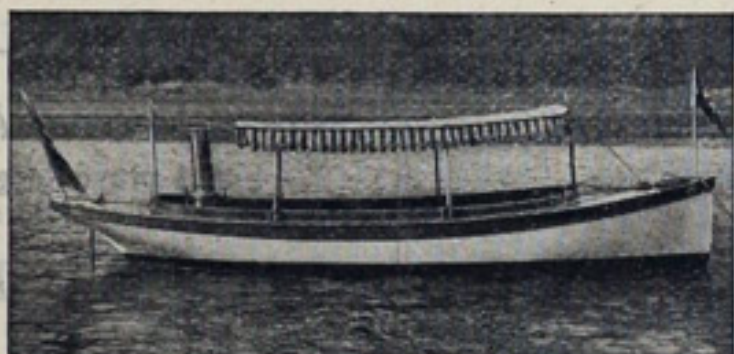
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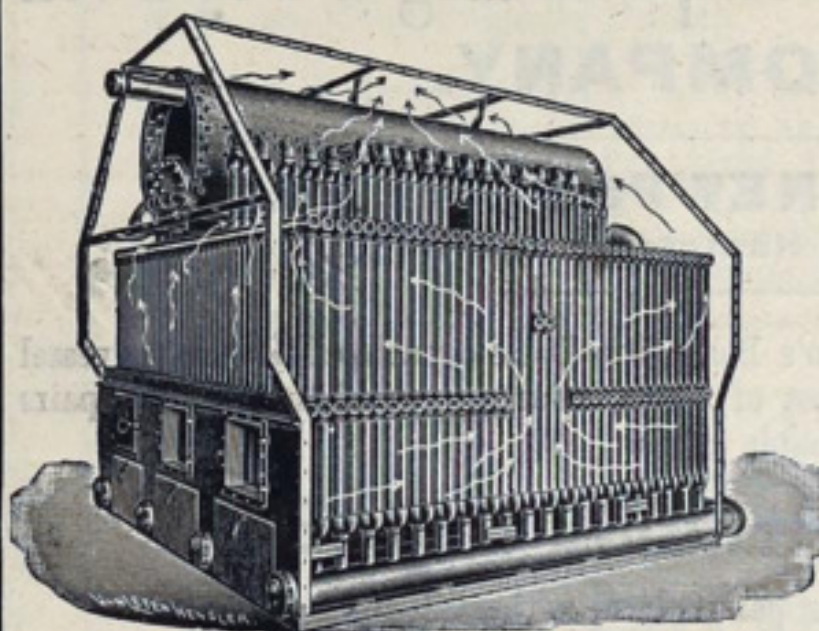
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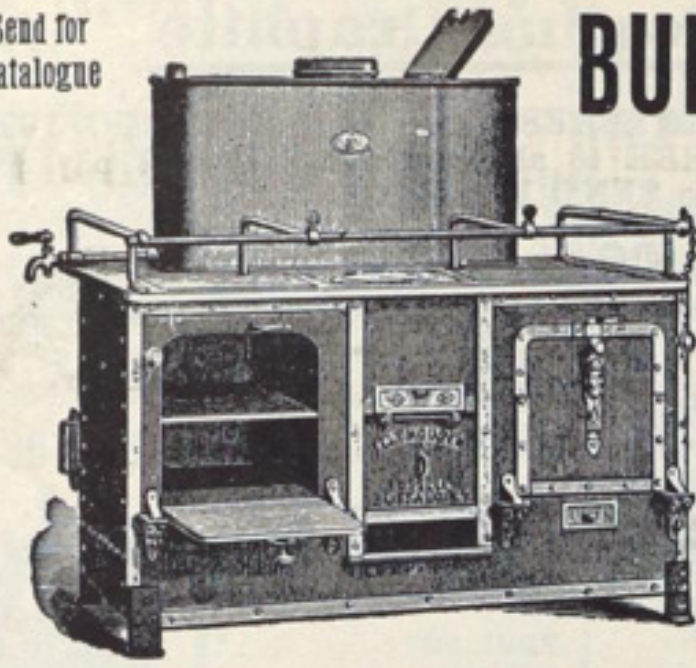


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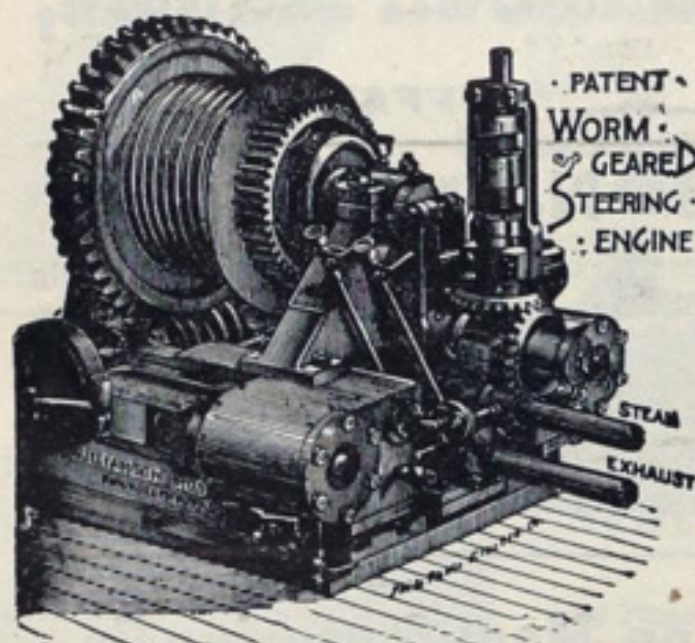
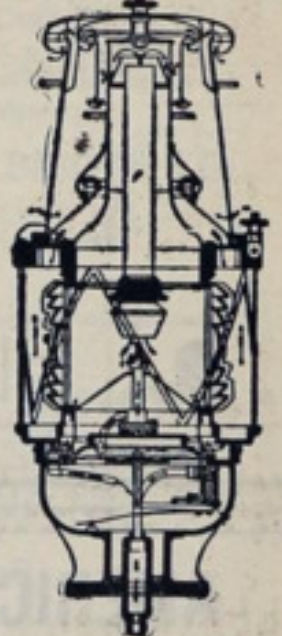
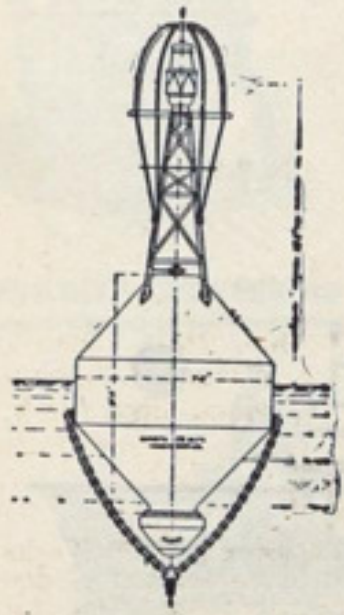
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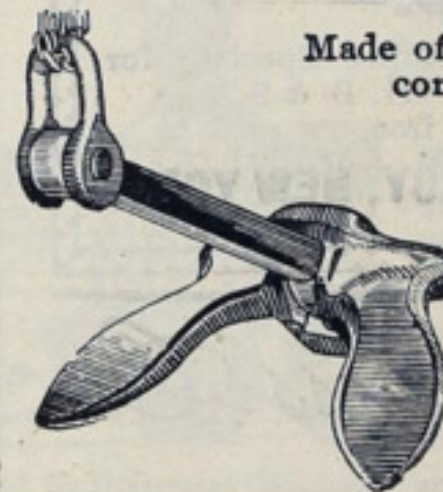
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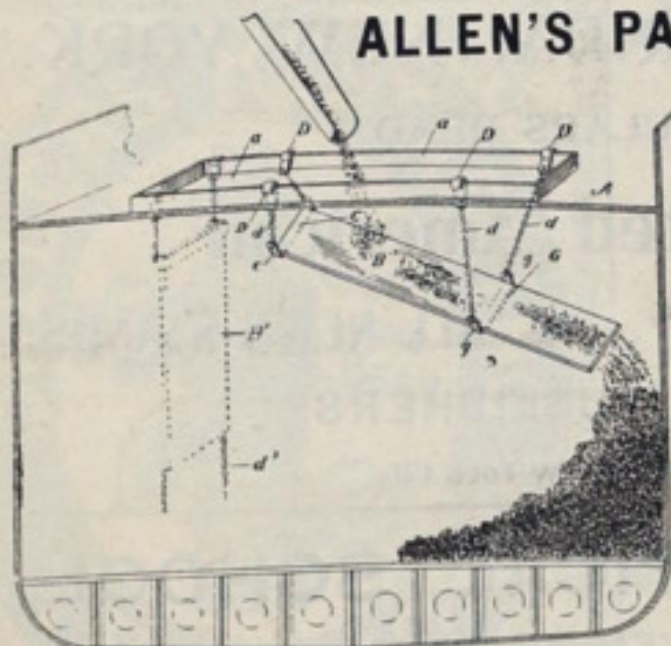
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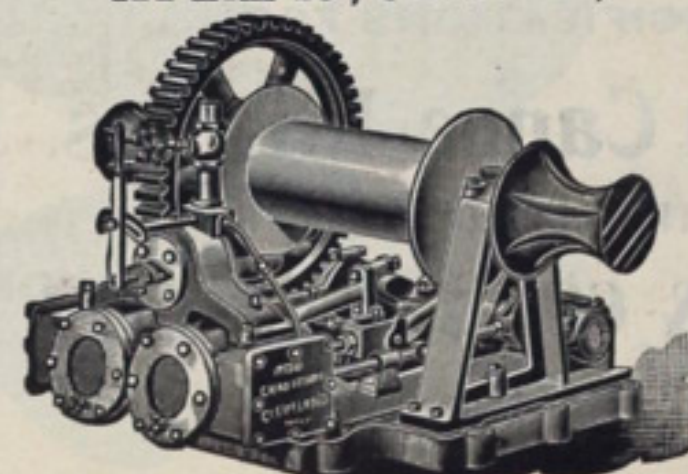
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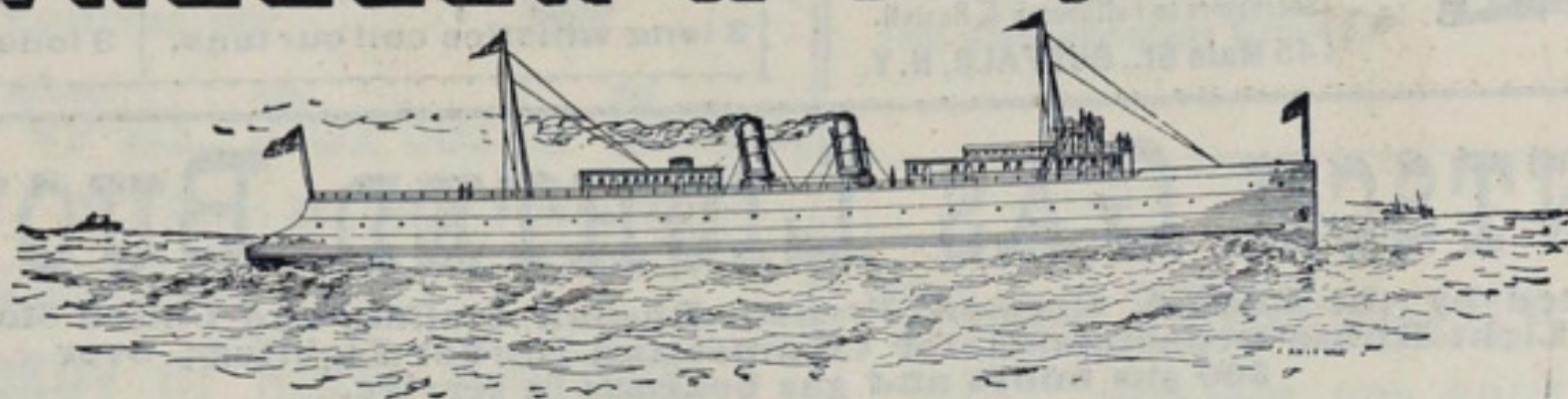
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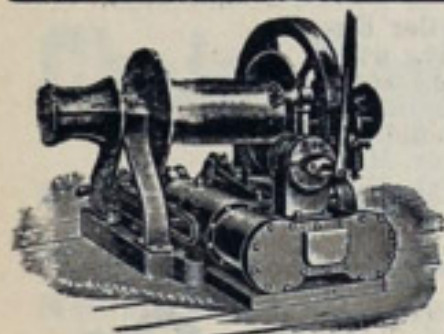
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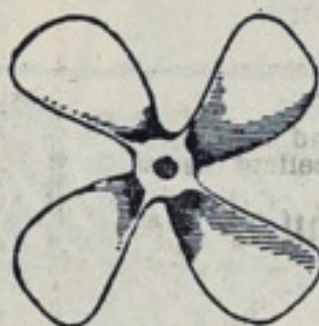
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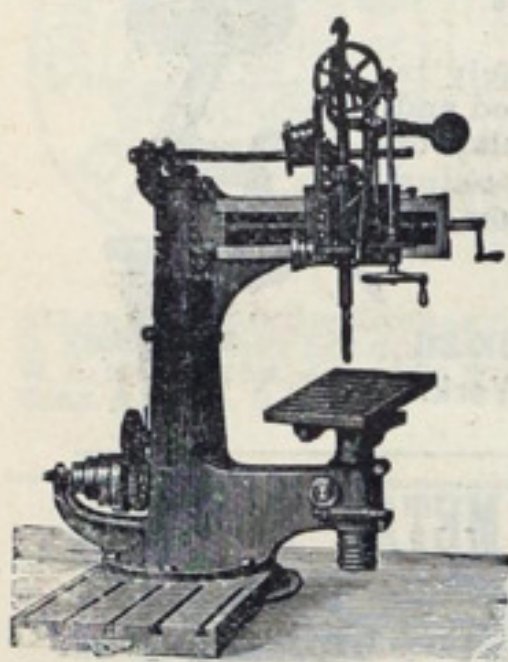
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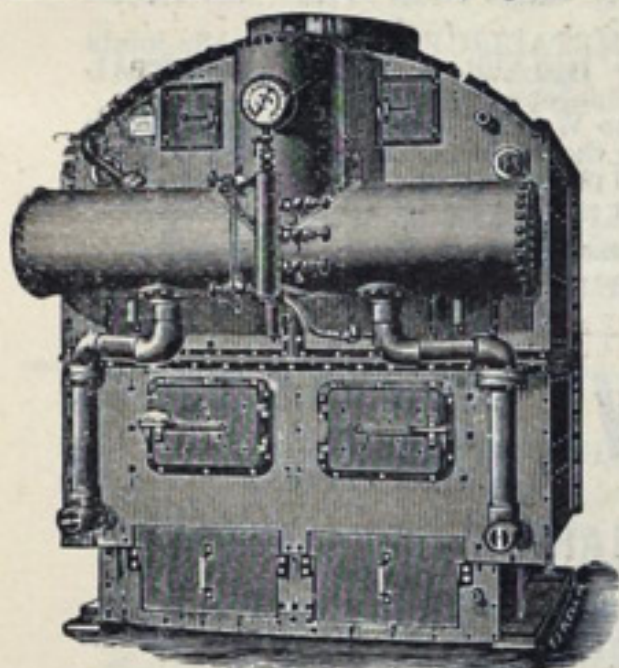
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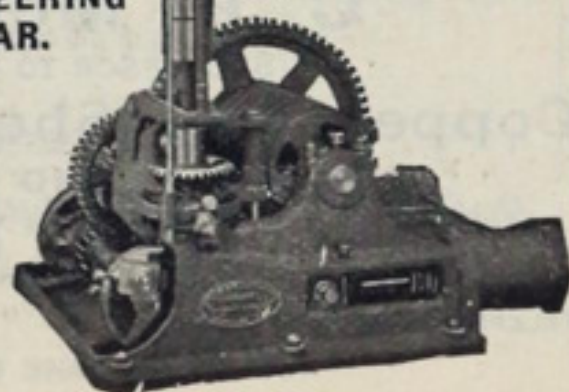


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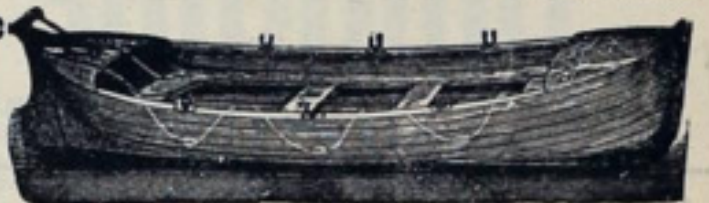
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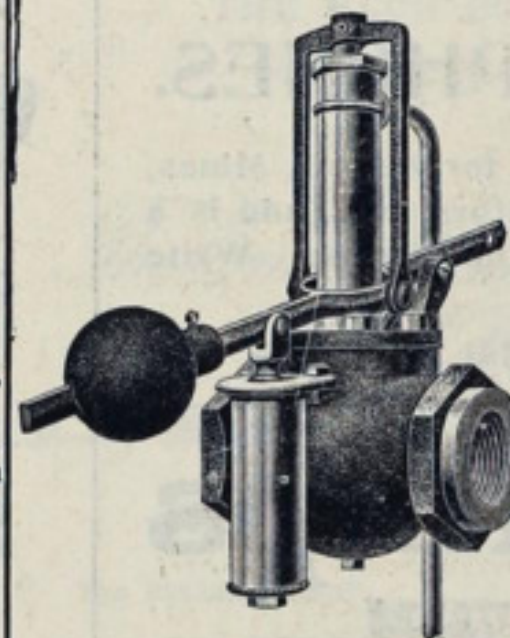
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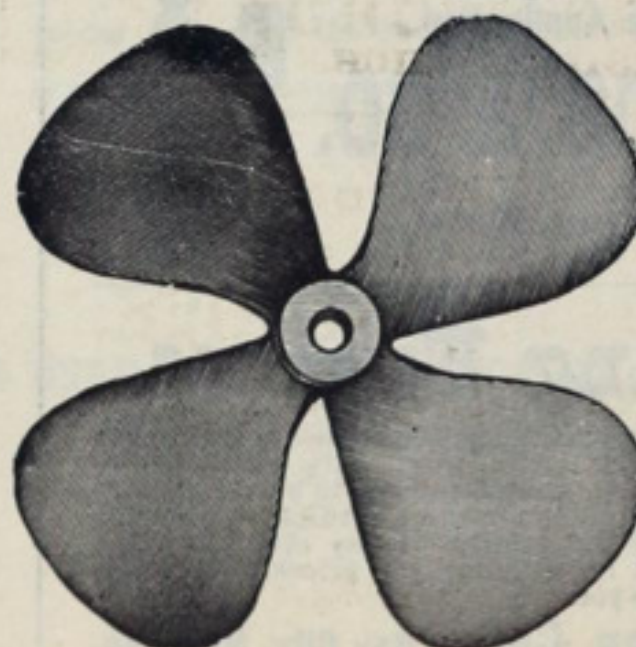
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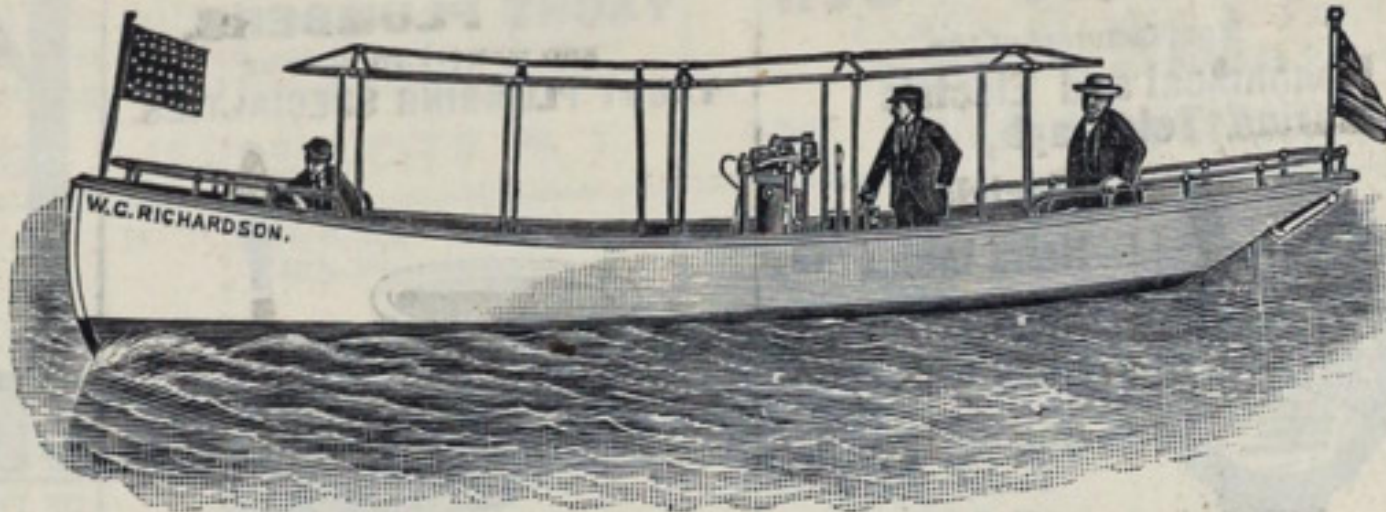


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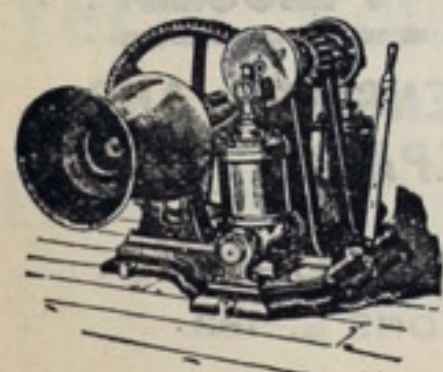
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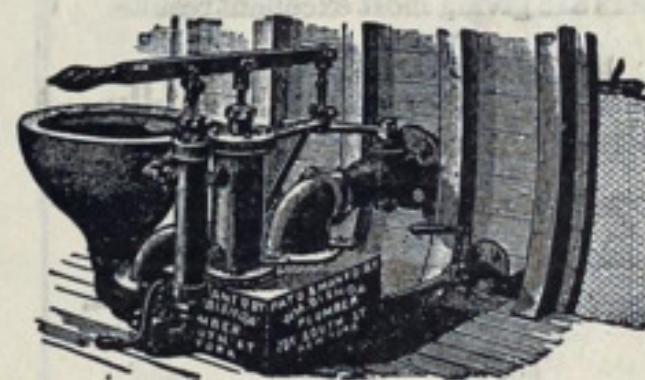
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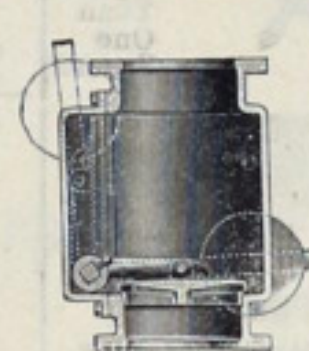
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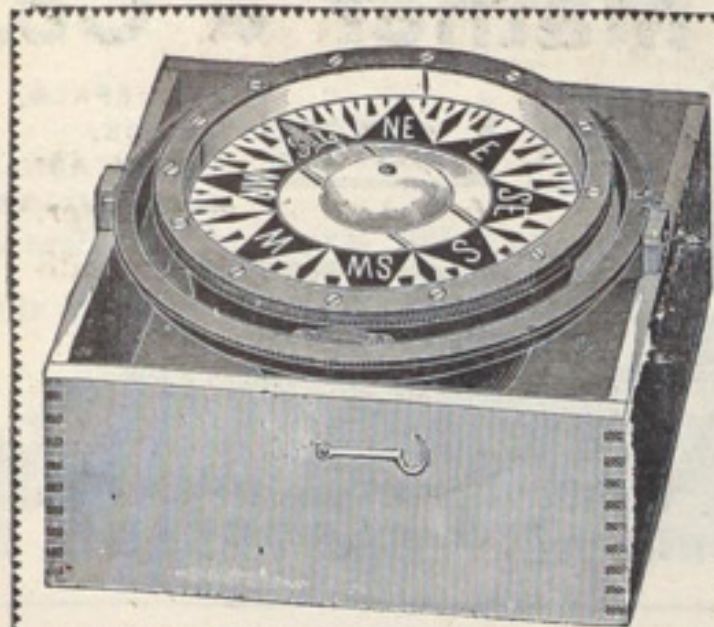
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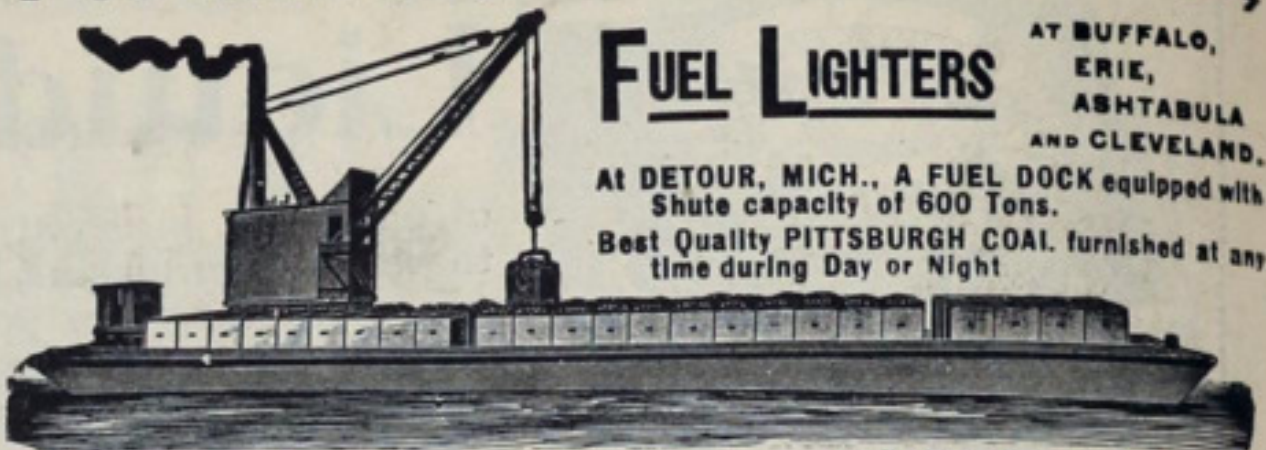
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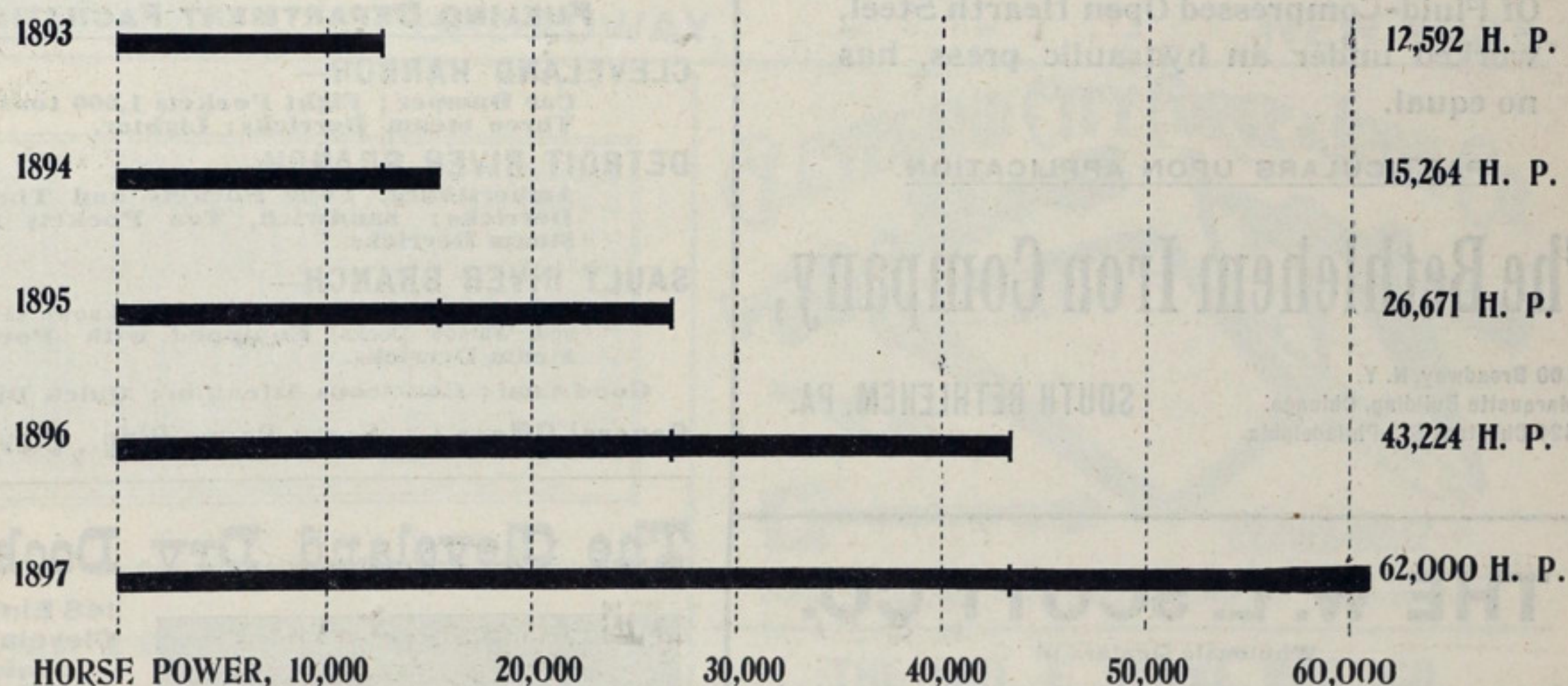
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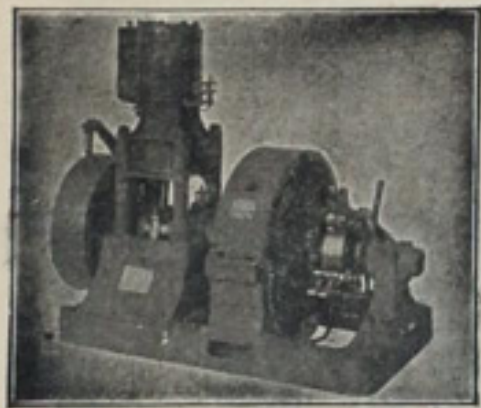
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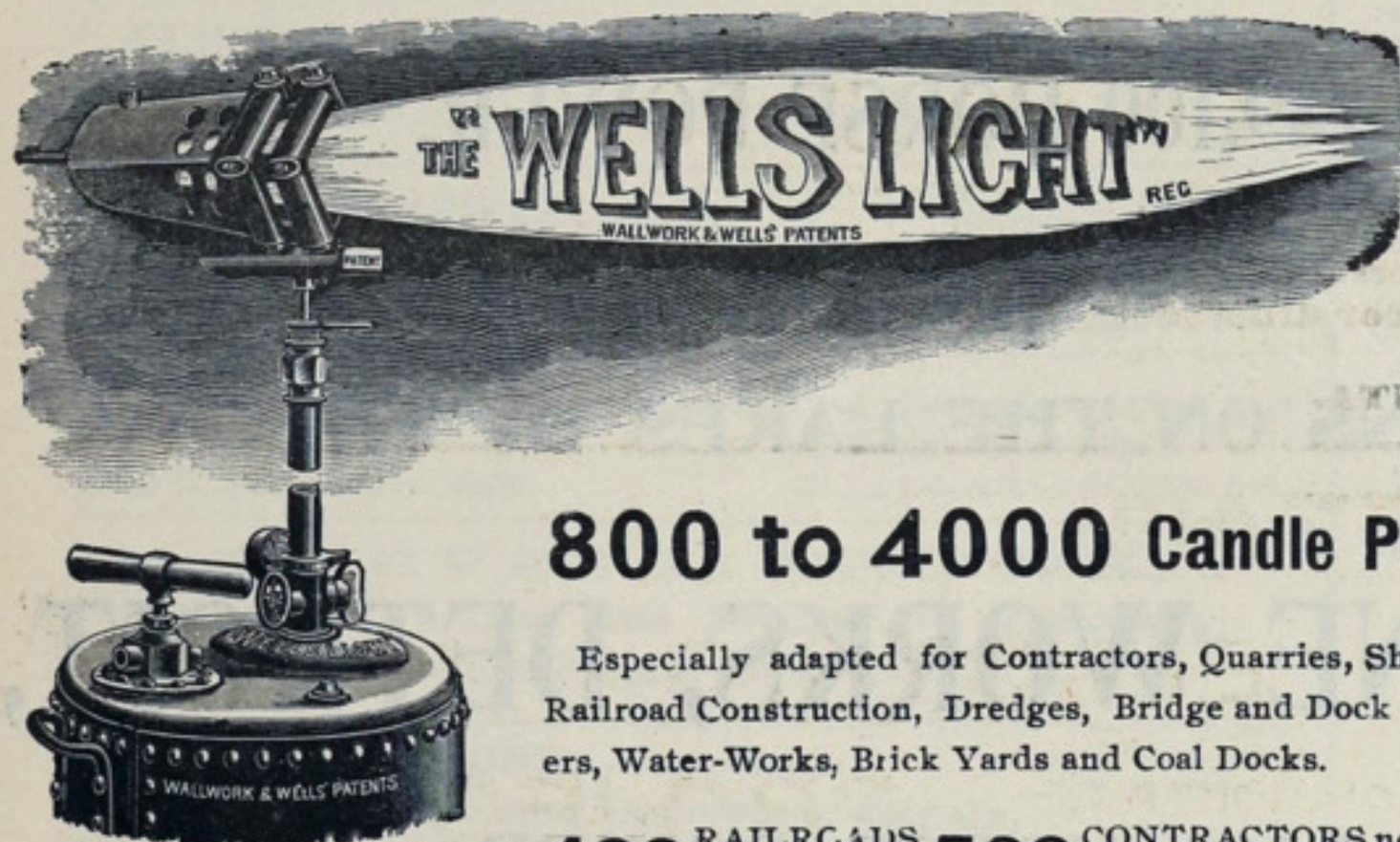
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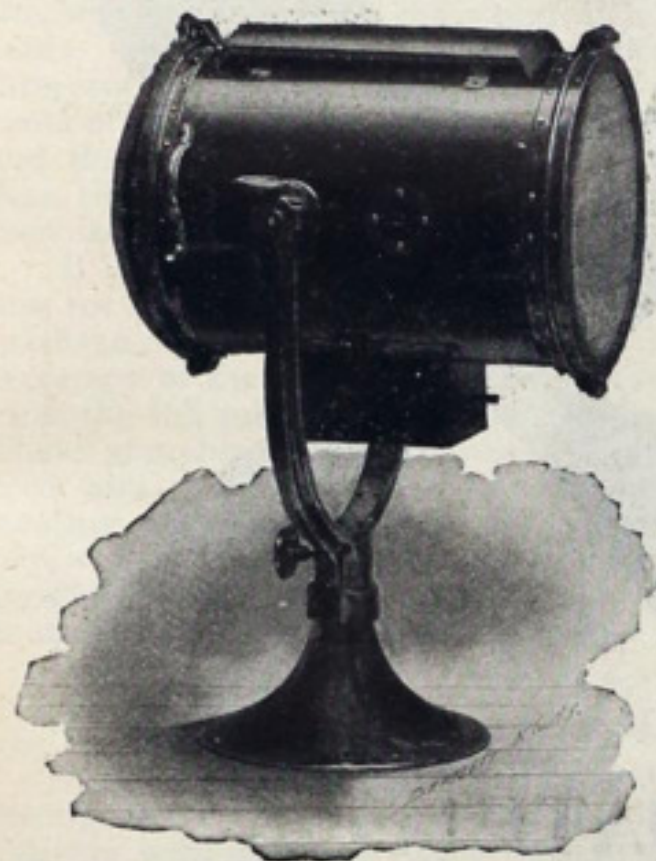
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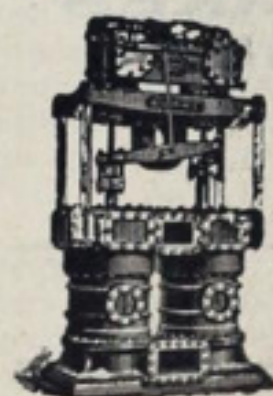
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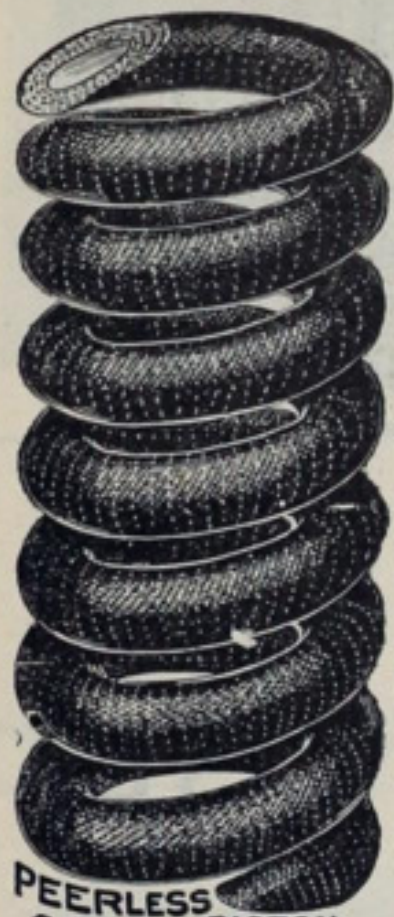
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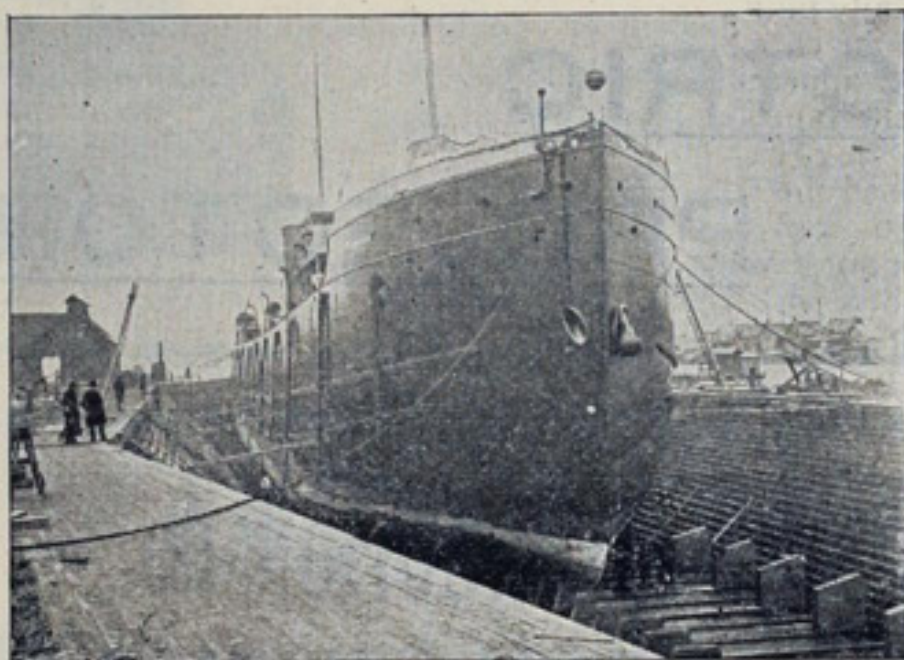
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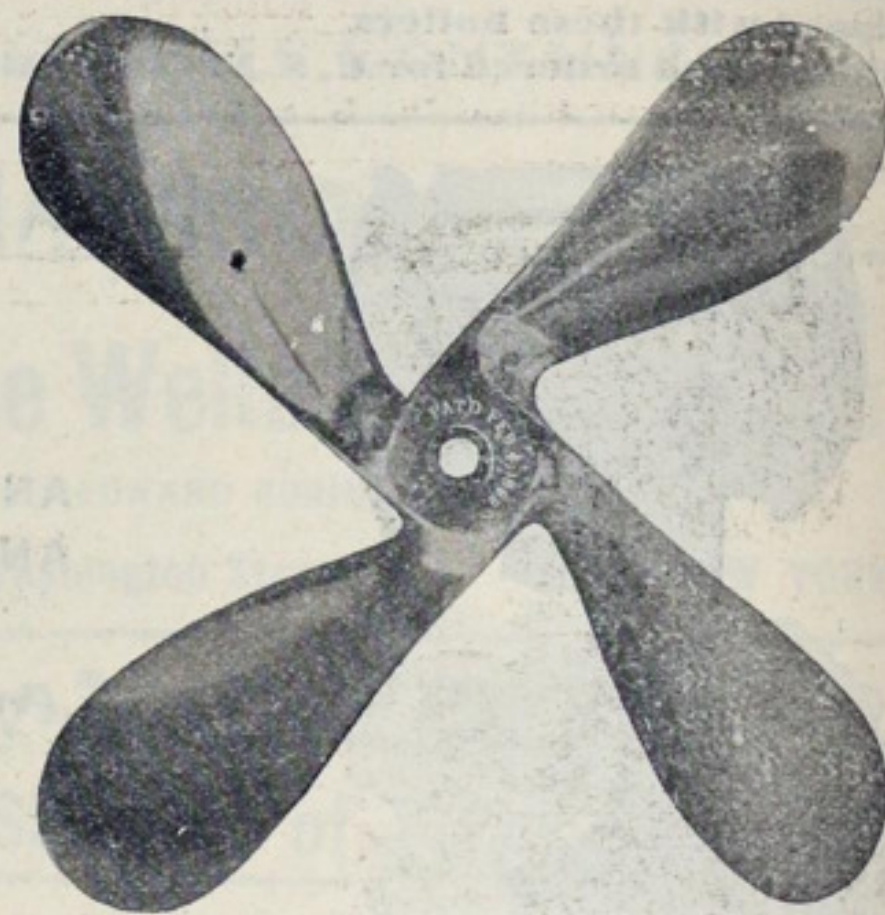
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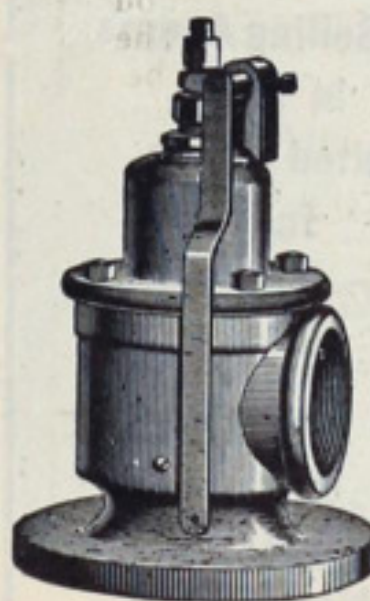
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